

**FCC 47 CFR PART 22 SUBPART H AND PART 24 SUBPART E**

**TEST REPORT**

**For**

**Xerox TMS**

**Model: IVU-4000**

**Trade Name: xerox**

*Issued to*

**Advantech Co.Ltd.**

**No.1, Alley 20, Lane 26, Rueiguang Road, Neihu District, Taipei 114, Taiwan, R.O.C.**

*Issued by*

**Compliance Certification Services Inc.**

**No.11, Wugong 6th Rd., Wugu Dist.,  
New Taipei City 24891, Taiwan. (R.O.C.)**

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**Issued Date: June 1, 2016**



Testing Laboratory  
1309

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**Revision History**

Rev.	Issue Date	Revisions	Effect Page	Revised By
00	June 1, 2016	Initial Issue	ALL	Doris Chu
01	July 18, 2016	1. Modify Peak and Average power.	P. 15 ~ 19	Doris Chu

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# 1. TEST RESULT CERTIFICATION

**Applicant:** Advantech Co.Ltd.  
 No.1, Alley 20, Lane 26, Rueiguang Road, Neihu District,  
 Taipei 114, Taiwan, R.O.C.

**Manufacturer:** Advantech Co.Ltd.  
 No.1, Alley 20, Lane 26, Rueiguang Road, Neihu District,  
 Taipei 114, Taiwan, R.O.C.

**Equipment Under Test:** Xerox TMS

**Trade Name:** xerox

**Model Number:** IVU-4000

**Date of Test:** March 29 ~ July 14, 2016

APPLICABLE STANDARDS	
STANDARD	TEST RESULT
FCC 47 CFR Part 22 Subpart H & Part 24 Subpart E	No non-compliance noted


**We hereby certify that:**

The above equipment was tested by Compliance Certification Services Inc. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in TIA/EIA-603-C: 2004 and the energy emitted by the sample EUT tested as described in this report is in compliance with conducted and radiated emission limits of FCC Rule FCC PART 22 Subpart H and PART 24 Subpart E.

The test results of this report relate only to the tested sample identified in this report.

*Approved by:*

*Tested by:*

Miller Lee  
 Section Manager  
 Compliance Certification Services Inc.

Dennis Li  
 Engineer  
 Compliance Certification Services Inc.

## 2. EUT DESCRIPTION

<b>Product</b>	Xerox TMS
<b>Trade Name</b>	xerox
<b>Model Number</b>	IVU-4000
<b>Received Date</b>	May 15, 2016
<b>Power Supply</b>	Powered from host device.
<b>Frequency Range</b>	GPRS / EDGE: 850: 824.2 ~ 848.8 MHz GPRS / EDGE: 1900: 1850.2 ~ 1909.8 MHz WCDMA / HSDPA / HSUPA Band II: 1852.4 ~ 1907.6 MHz WCDMA / HSDPA / HSUPA Band V: 826.4 ~ 846.6MHz
<b>Transmit Power (ERP &amp; EIRP Power)</b>	GPRS 850: 32.99 dBm GPRS 1900: 26.57 dBm EDGE 850: 27.06 dBm EDGE 1900: 23.86 dBm WCDMA Band II: 23.62 dBm HSDPA Band II: 23.84 dBm HSUPA Band II: 22.59 dBm WCDMA Band V: 24.93 dBm HSDPA Band V: 25.92 dBm HSUPA Band V: 25.72 dBm
<b>Cellular Phone Protocol</b>	GPRS: GMSK EDGE: 8PSK WCDMA: Quadrature Phase Shift Keying (QPSK) with Root-raised cosine pulse shaping filters (roll off = 0.22)
<b>Type of Emission</b>	GPRS 850: 244KGXW--- GPRS 1900: 244KGXW--- EDGE 850: 243KG7W--- EDGE 1900: 246KG7W--- WCDMA Band II: 4M18F9W--- WCDMA Band V: 4M17F9W--- HSDPA Band II: 4M18F9W--- HSDPA Band V: 4M17F9W--- HSUPA Band II: 4M18F9W--- HSUPA Band V: 4M18F9W---

<b>Antenna Gain</b>	1. GSA.8822.B.301111 / DIPOLE Antenna GPRS / EDGE 850: 2.53 dBi GPRS / EDGE 1900: -0.86 dBi WCDMA band II: -0.86 dBi WCDMA band V: 2.53 dBi 2. MA230.LBC.002 / MONOPOLE Antenna GPRS / EDGE 850: 2.16 dBi GPRS / EDGE 1900: 0.42 dBi WCDMA band II: 0.42 dBi WCDMA band V: 2.16 dBi
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**Remark:**

1. *The sample selected for test was engineering sample that approximated to production product and was provided by manufacturer.*
2. *This submittal(s) (test report) is intended for FCC ID: **M82-IVU4000** filing to comply with Part 22 and Part 24 of the FCC 47 CFR Rules.*

### **3. TEST METHODOLOGY**

Both conducted and radiated testing were performed according to the procedures document on chapter 13 of ANSI C63.10: 2013, TIA/EIA-603-C: 2004 and FCC CFR 47, Part 2, PART 22 SUBPART H AND PART 24 SUBPART E

#### **3.1 EUT CONFIGURATION**

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner that intends to maximize its emission characteristics in a continuous normal application.

#### **3.2 EUT EXERCISE**

The EUT was operated in the engineering mode to fix the TX frequency that was for the purpose of the measurements.

#### **3.3 GENERAL TEST PROCEDURES**

##### **Conducted Emissions**

According to the requirements in ANSI C63.10: 2013. Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-peak and average detector modes.

##### **Radiated Emissions**

The EUT is placed on a turn table, which is 0.8 m above ground plane. The turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna, which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the maximum emissions, exploratory radiated emission measurements were made according to the requirements in ANSI C63.10: 2013.

### 3.4 DESCRIPTION OF TEST MODES

The EUT (model: IVU-4000) had been tested under operating condition.

EUT staying in continuous transmitting mode was programmed.

GPRS / EDGE 850:

Channel Low (CH128), Channel Mid (CH190) and Channel High (CH251) were chosen for full testing.

GPRS / EDGE 1900:

Channel Low (CH512), Channel Mid (CH661) and Channel High (CH810) were chosen for full testing.

WCDMA Band II:

Channel Low (CH9262), Channel Mid (CH9400) and Channel High (CH9538) were chosen for full testing.

WCDMA Band V:

Channel Low (CH4132), Channel Mid (CH4182) and Channel High (CH4233) were chosen for full testing.

HSDPA Band II:

Channel Low (CH9262), Channel Mid (CH9400) and Channel High (CH9538) were chosen for full testing.

HSDPA Band V:

Channel Low (CH4132), Channel Mid (CH4182) and Channel High (CH4233) were chosen for full testing.

HSUPA Band II:

Channel Low (CH9262), Channel Mid (CH9400) and Channel High (CH9538) were chosen for full testing.

HSDPA Band V:

Channel Low (CH4132), Channel Mid (CH4182) and Channel High (CH4233) were chosen for full testing.

After verification, all tests were carried out with the worst case test modes as shown below except radiated spurious emission below 1GHz and power line conducted emissions below 30MHz, which worst case was in normal link mode only.

For GPRS / EDGE 850,

The field strength of spurious emission was measured in the following position: EUT stand-up position (Z axis), lie-down position (X, Y axis). The worst emission was found in stand-up position (Z axis) and the worst case was recorded.

For GPRS / EDGE 1900, WCDMA Band II, WCDMA Band V, HSDPA Band II, HSDPA Band V, HSUPA Band II, HSDPA Band V

The field strength of spurious emission was measured in the following position: EUT stand-up position (Z axis), lie-down position (X, Y axis). The worst emission was found in lie-down position (Y axis) and the worst case was recorded.



## 4. INSTRUMENT CALIBRATION

### 4.1 MEASURING INSTRUMENT CALIBRATION

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipment, which is traceable to recognized national standards.

### 4.2 MEASUREMENT EQUIPMENT USED

#### Equipment Used for Emissions Measurement

*Remark: Each piece of equipment is scheduled for calibration once a year and Loop Antenna is scheduled for calibration once three years.*

Conducted Emissions Test Site					
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due
DC Power Supplies	GW Instek	SPS-3610	GPE880163	01/19/2016	01/18/2017
Power Meter	Anritsu	ML2495A	1012009	07/04/2016	07/03/2017
Power Sensor	Anritsu	MA2411B	917072	07/04/2016	07/03/2017
Signal Analyzer	R&S	FSV 40	101073	07/20/2015	07/19/2016
Spectrum Analyzer	Agilent	E4446A	US42510268	02/15/2016	02/14/2017
Thermostatic/Hrgrosatic Chamber	TAICHY	MHG-150LF	930619	10/08/2015	10/07/2016
Vector Signal Generator	R&S	SMU 200A	102239	03/10/2016	03/09/2017
AC Power Source	EXTECH	6205	1140845	N.C.R	N.C.R

Wugu 966 Chamber A					
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due
Bilog Antenna	Sunol Sciences	JB3	A030105	08/06/2015	08/05/2016
EMI Test Receiver	R&S	ESCI	100064	06/04/2015	06/03/2016
Horn Antenna	EMCO	3117	55165	02/24/2016	02/23/2017
Horn Antenna	EMCO	3116	26370	01/15/2016	01/14/2017
K Type Cable	Huber+Suhner	SUCOFLEX 102	29406/2	01/12/2016	01/11/2017
K Type Cable	Huber+Suhner	SUCOFLEX 102	22470/2	01/12/2016	01/11/2017
Pre-Amplifier	MITEQ	AMF-6F-2604 00-40-8P	985646	01/14/2016	01/13/2017
Pre-Amplifier	EMCI	EMC 012635	980151	06/05/2015	06/04/2016
Pre-Amplifier	EMCI	EM330	N/A	06/05/2015	06/04/2016
Spectrum Analyzer	Agilent	E4446A	US42510252	12/08/2015	12/07/2016
Antenna Tower	CCS	CC-A-1F	N/A	N.C.R	N.C.R
Controller	CCS	CC-C-1F	N/A	N.C.R	N.C.R
Turn Table	CCS	CC-T-1F	N/A	N.C.R	N.C.R
Software	EZ-EMC (CCS-3A1RE)				

### 4.3 MEASUREMENT UNCERTAINTY

PARAMETER	UNCERTAINTY
3M Semi Anechoic Chamber / 30M~200M	+/- 4.0138
3M Semi Anechoic Chamber / 200M~1000M	+/- 3.9483
3M Semi Anechoic Chamber / 1G~8G	+/- 2.5975
3M Semi Anechoic Chamber / 8G~18G	+/- 2.6112
3M Semi Anechoic Chamber / 18G~26G	+/- 2.7389
3M Semi Anechoic Chamber / 26G~40G	+/- 2.9683

**Remark:** This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of  $k=2$ .

## **5. FACILITIES AND ACCREDITATIONS**

### **5.1 FACILITIES**

No.199, Chunghsen Road, Hsintien City, Taipei Hsien, Taiwan, R.O.C.

Tel: 886-2-2217-0894 / Fax: 886-2-2217-1029

No.11, Wugong 6th Rd., Wugu Dist., New Taipei City 24891, Taiwan. (R.O.C.)

Tel: 886-2-2299-9720 / Fax: 886-2-2298-4045

No.81-1, Lane 210, Bade 2nd Rd., Lujhu Township, Taoyuan County 33841, TAIWAN,  
R.O.C.

Tel: 886-3-324-0332 / Fax: 886-3-324-5235

The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 and CISPR Publication 22.

### **5.2 EQUIPMENT**



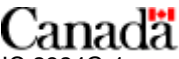
Radiated emissions are measured with one or more of the following types of linearly polarized antennas: tuned dipole, biconical, log periodic, bi-log, and/or ridged waveguide, horn. Spectrum analyzers with pre-selectors and quasi-peak detectors are used to perform radiated measurements.

Conducted emissions are measured with Line Impedance Stabilization Networks and EMI Test Receivers.

Calibrated wideband preamplifiers, coaxial cables, and coaxial attenuators are also used for making measurements.

All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

### 5.3 TABLE OF ACCREDITATIONS AND LISTINGS

Country	Agency	Scope of Accreditation	Logo
USA	FCC	3M Semi Anechoic Chamber (FCC MRA: TW1039) to perform FCC Part 15 measurements	 FCC MRA: TW1039
Taiwan	TAF	LP0002, RTTE01, FCC Method-47 CFR Part 15 Subpart C, D, E, RSS-210, RSS-310 IDA TS SRD, AS/NZS 4268, AS/NZS 4771, TS 12.1 & 12.2, ETSI EN 300 440-1, ETSI EN 300 440-2, ETSI EN 300 328, ETSI EN 300 220-1, ETSI EN 300 220-2, ETSI EN 301 893, ETSI EN 301 489-1/3/7/17 FCC OET Bulletin 65 + Supplement C, EN 50360, EN 50361, EN 50371, RSS 102, EN 50383, EN 50385, EN 50392, IEC 62209, CNS 14958-1, CNS 14959 FCC Method -47 CFR Part 15 Subpart B IEC / EN 61000-3-2, IEC / EN 61000-3-3, IEC / EN 61000-4-2/3/4/5/6/8/11	 Testing Laboratory 1309
Canada	Industry Canada	3M Semi Anechoic Chamber (IC 2324G-1 / IC 2324G-2) to perform	 IC 2324G-1 IC 2324G-2

*\* No part of this report may be used to claim or imply product endorsement by A2LA or any agency of the US Government.*

## 6. SETUP OF EQUIPMENT UNDER TEST

### 6.1 SETUP CONFIGURATION OF EUT

See test photographs attached in Appendix I for the actual connections between EUT and support equipment.

### 6.2 SUPPORT EQUIPMENT

No.	Device Type	Brand	Model	FCC ID	Series No.	Data Cable	Power Cord
	N/A						

**Remark:**

- 1. All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.*
- 2. Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.*

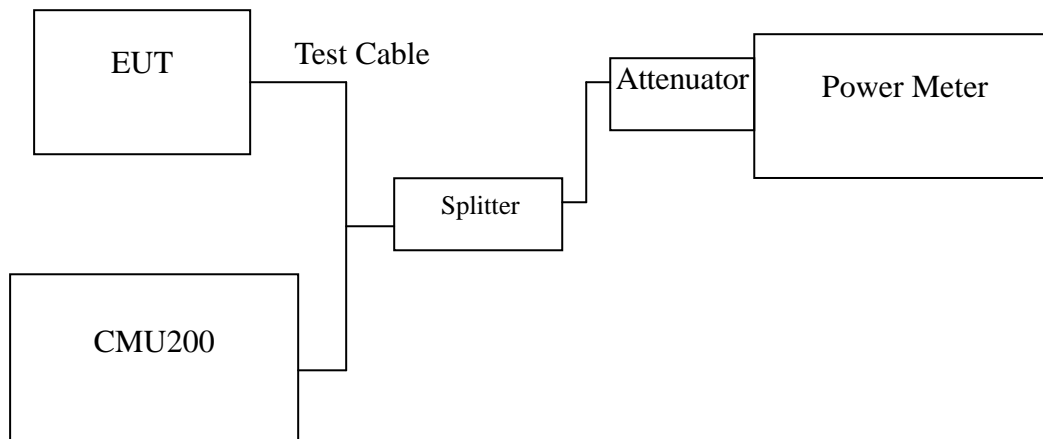
## 7. FCC PART 22 & 24 REQUIREMENTS

### 7.1 PEAK POWER

#### LIMIT

According to FCC §2.1046.

#### Test Configuration



*Remark: Measurement setup for testing on Antenna connector*

#### TEST PROCEDURE

The transmitter output was connected to a calibrated attenuator, the other end of which was connected to a power meter. Transmitter output was read off the power meter in dBm. The power output at the transmitter antenna port was determined by adding the value of the attenuator to the power meter reading.

#### TEST RESULTS

*No non-compliance noted.*

**Test Data**

Test Mode	CH	Frequency (MHz)	Peak Power (dBm)	Output Power (W)
GPRS 850	128	824.20	32.30	1.69824
	190	836.60	32.20	1.65959
	251	848.80	32.70	1.86209
EDGE 850	128	824.20	26.66	0.46345
	190	836.60	26.67	0.46452
	251	848.80	26.53	0.44978

Test Mode	CH	Frequency (MHz)	Peak Power (dBm)	Output Power (W)
GPRS 1900	512	1850.20	27.90	0.61660
	661	1880.00	28.30	0.67608
	810	1909.80	27.50	0.56234
EDGE 1900	512	1850.20	24.61	0.28907
	661	1880.00	24.69	0.29444
	810	1909.80	23.81	0.24044

**Remark:** The value of factor includes both the loss of cable and external attenuator

Test Mode	CH	Frequency (MHz)	Peak Power (dBm)	Output Power (W)
WCDMA (BAND II)	9262	1852.40	23.45	0.22131
	9400	1880.00	23.42	0.21979
	9538	1907.60	23.74	0.23659
WCDMA (BAND V)	4132	826.40	23.56	0.22699
	4182	836.60	23.78	0.23878
	4233	846.60	23.89	0.24491

Test Mode	CH	Frequency (MHz)	Peak Power (dBm)	Output Power (W)
HSDPA (BAND II)	9262	1852.40	23.97	0.24946
	9400	1880.00	23.82	0.24099
	9538	1907.60	23.78	0.23878
HSDPA (BAND V)	4132	826.40	23.25	0.21135
	4182	836.40	23.52	0.22491
	4233	846.60	23.69	0.23388

Test Mode	CH	Frequency (MHz)	Peak Power (dBm)	Output Power (W)
HSUPA (BAND II)	9262	1852.40	23.72	0.23550
	9400	1880.00	23.69	0.23388
	9538	1907.60	23.86	0.24322
HSUPA (BAND V)	4132	826.40	23.47	0.22233
	4182	836.40	23.58	0.22803
	4233	846.60	23.69	0.23388

**Remark:** The value of factor includes both the loss of cable and external attenuator

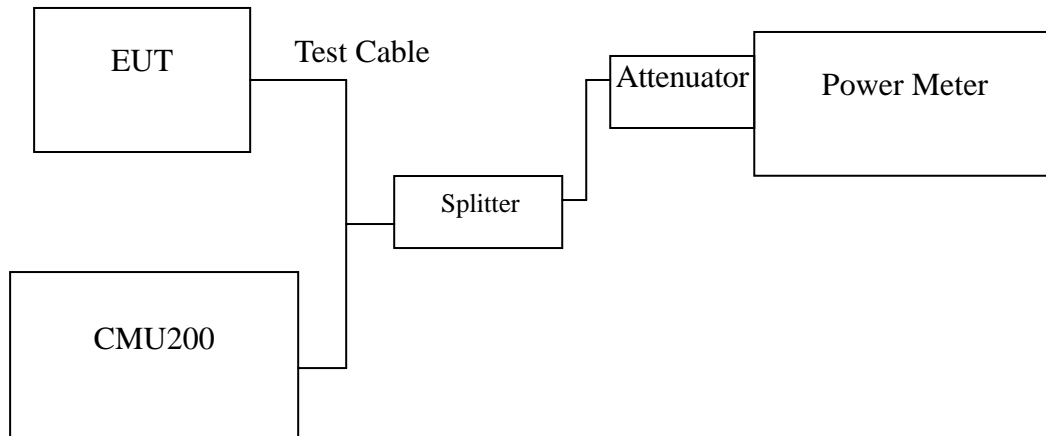


## 7.2 AVERAGE POWER

### LIMIT

For reporting purposes only.

### Test Configuration



*Remark: Measurement setup for testing on Antenna connector*

### TEST PROCEDURE

The transmitter output was connected to a calibrated attenuator, the other end of which was connected to a power meter. Transmitter output was read off the power meter in dBm. The power output at the transmitter antenna port was determined by adding the value of the attenuator to the power meter reading.

### TEST RESULTS

*No non-compliance noted.*

**Test Data**

Test Mode	CH	Frequency (MHz)	AVG Power (dBm)	Output Power W
GPRS 850	128	824.20	32.10	1.62181
	190	836.60	32.00	1.58489
	251	848.80	32.50	1.77828
EDGE 850	128	824.20	26.43	0.43954
	190	836.60	26.49	0.44566
	251	848.80	26.32	0.42855

Test Mode	CH	Frequency (MHz)	AVG Power (dBm)	Output Power W
GPRS 1900	512	1850.20	27.70	0.58884
	661	1880.00	28.10	0.64565
	810	1909.80	27.30	0.53703
EDGE 1900	512	1850.20	24.33	0.27102
	661	1880.00	24.58	0.28708
	810	1909.80	23.67	0.23281

**Remark:** The value of factor includes both the loss of cable and external attenuator

Test Mode	CH	Frequency (MHz)	AVG Power (dBm)	Output Power W
WCDMA (BAND II)	9262	1852.40	21.96	0.15704
	9400	1880.00	21.11	0.12912
	9538	1907.60	21.87	0.15382
WCDMA (BAND V)	4132	826.40	21.99	0.15812
	4182	836.40	22.29	0.16943
	4233	846.60	22.39	0.17338

Test Mode	CH	Frequency (MHz)	AVG Power (dBm)	Output Power W
HSDPA (BAND II)	9262	1852.40	21.51	0.14158
	9400	1880.00	21.45	0.13964
	9538	1907.60	21.39	0.13772
HSDPA (BAND V)	4132	826.40	21.31	0.13521
	4182	836.40	21.62	0.14521
	4233	846.60	21.92	0.15560

Test Mode	CH	Frequency (MHz)	AVG Power (dBm)	Output Power W
HSUPA (BAND II)	9262	1852.40	20.96	0.12474
	9400	1880.00	20.93	0.12388
	9538	1907.60	21.31	0.13521
HSUPA (BAND V)	4132	826.40	20.89	0.12274
	4182	836.40	21.30	0.13490
	4233	846.60	21.34	0.13614

**Remark:** The value of factor includes both the loss of cable and external attenuator

## 7.3 ERP & EIRP MEASUREMENT

### LIMIT

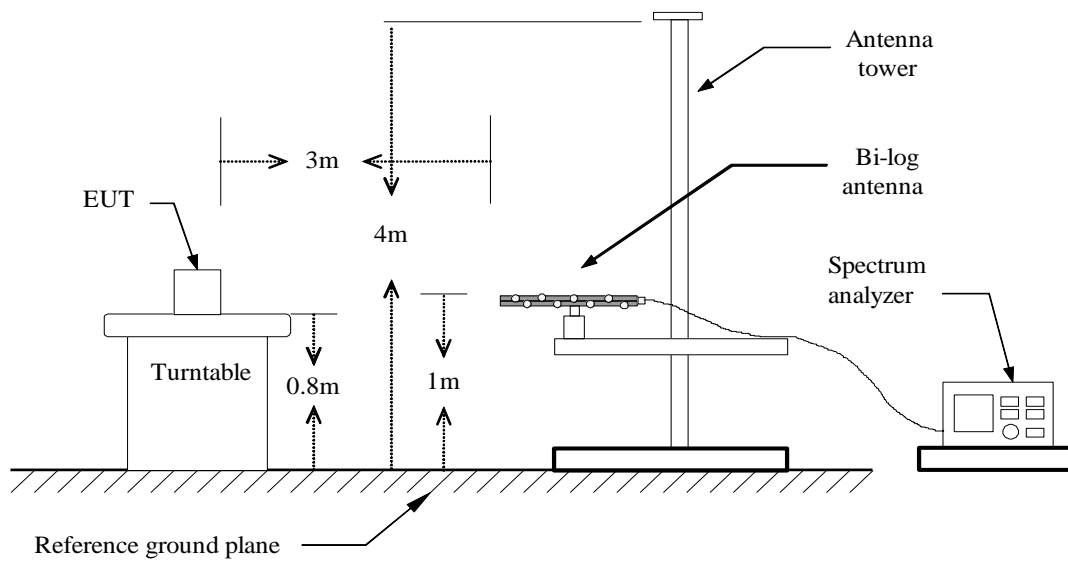
According to FCC §2.1046

FCC 22.913(a): The Effective Radiated Power (ERP) of mobile transmitters must not exceed 7 Watts.

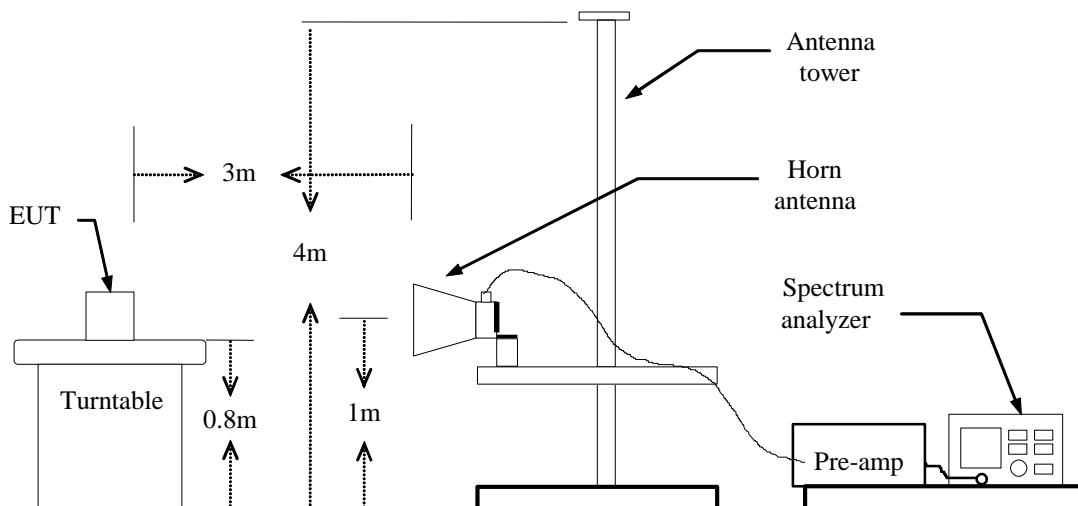
FCC 24.232(b): The equivalent Isotropic Radiated Power (EIRP) must not exceed 2 Watts.

### Test Configuration

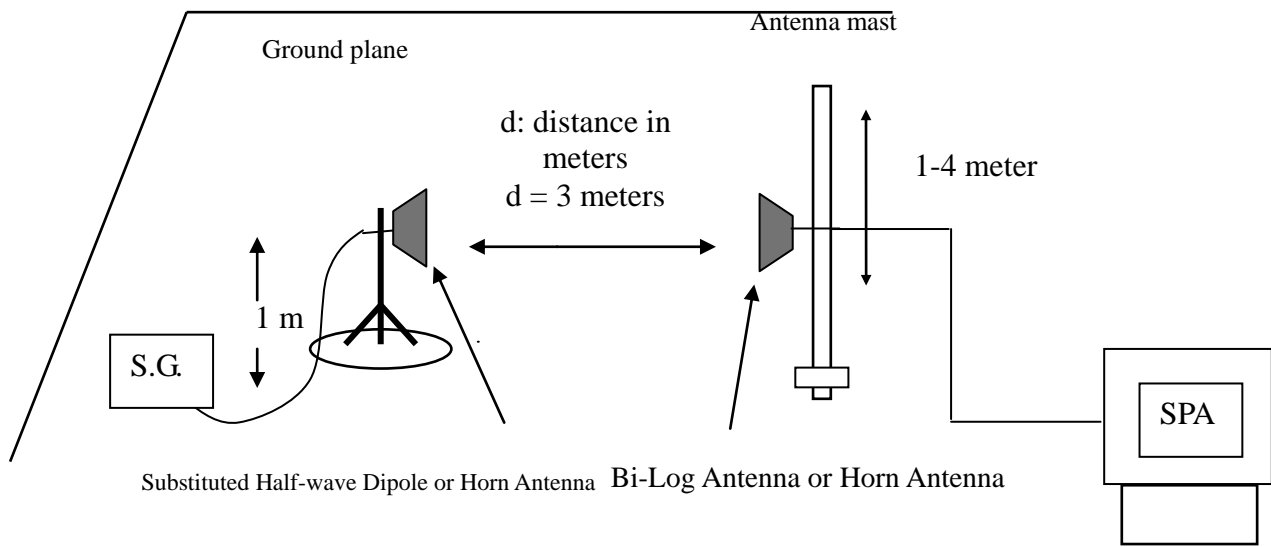
#### Below 1 GHz



#### Above 1 GHz



**For Substituted Method Test Set-UP**



**TEST PROCEDURE**

The EUT was placed on an non-conductive turntable using a non-conductive support. The radiated emission at the fundamental frequency was measured at 3 m with a test antenna and EMI spectrum analyzer.

During the measurement of the EUT, the resolution bandwidth was set to 5MHz and the average bandwidth was set to 50MHz. The highest emission was recorded with the rotation of the turntable and the lowering of the test antenna. The reading was recorded and the field strength (E in dBuV/m) was calculated.

ERP in frequency band 824-849MHz, and EIRP in frequency band 1851.25 –1910MHz were measured using a substitution method. The EUT was replaced by half-wave dipole (824-849MHz) or horn antenna (1851.25-1910MHz) connected to a signal generator. The spectrum analyzer reading was recorded and ERP/EIRP was calculated as follows:

$$\text{ERP} = \text{S.G. output (dBm)} + \text{Antenna Gain (dBi)} - \text{Cable (dB)} - 2.15$$

$$\text{EIRP} = \text{S.G. output (dBm)} + \text{Antenna Gain (dBi)} - \text{Cable (dB)}$$

**TEST RESULTS**

*No non-compliance noted.*

**GPRS 850 TEST DATA**

Channel	Frequency (MHz)	Antenna Pol.	S.G. (dBm)	Cable loss (dB)	Ant.Gain (dBi)	Emission level (dBm)	Limit (dBm)	Margin (dB)
128	824.3600	V	30.05	3.39	6.24	32.90	38.45	-5.55
	824.2400	H	22.65	3.39	6.24	25.50	38.45	-12.95
190	836.7800	V	29.13	3.4	6.37	32.10	38.45	-6.35
	836.6000	H	21.66	3.4	6.37	24.63	38.45	-13.82
251	849.2000	V	29.99	3.4	6.4	<b>*32.99</b>	38.45	-5.46
	849.0200	H	21.79	3.4	6.4	24.79	38.45	-13.66

**GPRS 1900 TEST DATA**

Channel	Frequency (MHz)	Antenna Pol.	S.G. (dBm)	Cable loss (dB)	Ant.Gain (dBi)	Emission level (dBm)	Limit (dBm)	Margin (dB)
512	1850.160	V	26.27	5.37	5.67	<b>*26.57</b>	33.00	-6.43
	1850.040	H	25.28	5.37	5.67	25.58	33.00	-7.42
661	1880.160	V	23.87	5.42	5.62	24.07	33.00	-8.93
	1850.040	H	25.28	5.37	5.67	25.58	33.00	-7.42
810	1909.680	V	24.22	5.48	5.56	24.30	33.00	-8.70
	1909.800	H	22.56	5.48	5.56	22.64	33.00	-10.36

**EDGE 850 Test Data**

Channel	Frequency (MHz)	Antenna Pol.	S.G. (dBm)	Cable loss (dB)	Ant.Gain (dBi)	Emission level (dBm)	Limit (dBm)	Margin (dB)
128	824.4200	V	23.62	3.39	6.24	26.47	38.45	-11.98
	824.3000	H	19.85	3.39	6.24	22.70	38.45	-15.75
190	836.8400	V	22.78	3.4	6.37	25.75	38.45	-12.70
	836.4200	H	18.97	3.4	6.36	21.93	38.45	-16.52
251	848.6600	V	24.06	3.4	6.4	<b>*27.06</b>	38.45	-11.39
	848.7200	H	19.61	3.4	6.4	22.61	38.45	-15.84

**EDGE 1900 Test Data**

Channel	Frequency (MHz)	Antenna Pol.	S.G. (dBm)	Cable loss (dB)	Ant.Gain (dBi)	Emission level (dBm)	Limit (dBm)	Margin (dB)
512	1850.160	V	23.35	5.37	5.67	23.65	33.00	-9.35
	1850.160	H	22.1	5.37	5.67	22.40	33.00	-10.60
661	1880.040	V	22.82	5.42	5.62	23.02	33.00	-9.98
	1879.920	H	21.44	5.42	5.62	22.64	33.00	-10.36
810	1909.680	V	23.78	5.48	5.56	<b>*23.86</b>	33.00	-9.14
	1909.920	H	21.94	5.48	5.56	22.02	33.00	-10.98

**WCDMA Test Data (BAND II)**

Channel	Frequency (MHz)	Antenna Pol.	S.G. (dBm)	Cable loss (dB)	Ant.Gain (dBi)	Emission level (dBm)	Limit (dBm)	Margin (dB)
9262	1853.760	V	21.41	5.38	5.66	21.69	33.00	-11.31
	1853.160	H	20.7	5.38	5.66	20.98	33.00	-12.02
9400	1879.200	V	23.42	5.42	5.62	<b>*23.62</b>	33.00	-9.38
	1879.320	H	21.3	5.42	5.62	21.50	33.00	-11.50
9538	1908.960	V	21.81	5.47	5.56	21.90	33.00	-11.10
	1908.720	H	20.16	5.47	5.56	20.25	33.00	-12.75

**WCDMA Test Data (BAND V)**

Channel	Frequency (MHz)	Antenna Pol.	S.G. (dBm)	Cable loss (dB)	Ant.Gain (dBi)	Emission level (dBm)	Limit (dBm)	Margin (dB)
4132	825.3200	V	15.16	3.39	6.25	18.02	38.45	-20.43
	825.3200	H	20.97	3.39	6.25	23.83	38.45	-14.62
4182	837.0800	V	14.25	3.4	6.37	17.22	38.45	-21.23
	837.2000	H	21.96	3.4	6.37	<b>*24.93</b>	38.45	-13.52
4233	845.7800	V	13.44	3.4	6.4	16.44	38.45	-22.01
	845.9600	H	21.7	3.4	6.4	24.70	38.45	-13.75

**HSDPA BAND II Test Data**

Channel	Frequency (MHz)	Antenna Pol.	S.G. (dBm)	Cable loss (dB)	Ant.Gain (dBi)	Emission level (dBm)	Limit (dBm)	Margin (dB)
9262	1853.520	V	22.53	5.38	5.66	22.81	33.00	-10.19
	1853.160	H	20.82	5.38	5.66	21.10	33.00	-11.90
9400	1881.360	V	22.73	5.42	5.61	22.92	33.00	-10.08
	1881.120	H	21.75	5.42	5.61	21.94	33.00	-11.06
9538	1908.600	V	23.75	5.47	5.56	<b>*23.84</b>	33.00	-9.16
	1908.960	H	20.22	5.47	5.56	20.31	33.00	-12.69

**HSDPA BAND V Test Data**

Channel	Frequency (MHz)	Antenna Pol.	S.G. (dBm)	Cable loss (dB)	Ant.Gain (dBi)	Emission level (dBm)	Limit (dBm)	Margin (dB)
4132	827.2400	V	13.31	3.39	6.27	16.19	38.45	-22.26
	825.4400	H	23.06	3.39	6.25	<b>*25.92</b>	38.45	-12.53
4182	835.1600	V	14.8	3.4	6.35	17.75	38.45	-20.70
	837.5600	H	22.83	3.41	6.38	25.80	38.45	-12.65
4233	845.4800	V	14.3	3.4	6.4	17.30	38.45	-21.15
	845.6600	H	22.78	3.4	6.4	25.78	38.45	-12.67

**HSUPA BAND II Test Data**

Channel	Frequency (MHz)	Antenna Pol.	S.G. (dBm)	Cable loss (dB)	Ant.Gain (dBi)	Emission level (dBm)	Limit (dBm)	Margin (dB)
9262	1853.880	V	14.38	5.38	5.66	14.66	33.00	-18.34
	1851.720	H	20.29	5.37	5.67	20.59	33.00	-12.41
9400	1878.960	V	22.39	5.42	5.62	<b>*22.59</b>	33.00	-10.41
	1880.880	H	21.63	5.42	5.61	21.82	33.00	-11.18
9538	1908.720	V	20.98	5.47	5.56	21.07	33.00	-11.93
	1908.480	H	20.43	5.47	5.56	20.52	33.00	-12.48

**HSUPA BAND V Test Data**

Channel	Frequency (MHz)	Antenna Pol.	S.G. (dBm)	Cable loss (dB)	Ant.Gain (dBi)	Emission level (dBm)	Limit (dBm)	Margin (dB)
4132	827.3600	V	13.62	3.39	6.27	16.50	38.45	-21.95
	825.5000	H	22.86	3.39	6.25	<b>*25.72</b>	38.45	-12.73
4182	837.6200	V	14.76	3.41	6.38	17.73	38.45	-20.72
	837.3800	H	22.39	3.4	6.37	25.36	38.45	-13.09
4233	825.4400	V	13.3	3.39	6.25	16.16	38.45	-22.29
	825.4400	H	22.73	3.39	6.25	25.59	38.45	-12.86

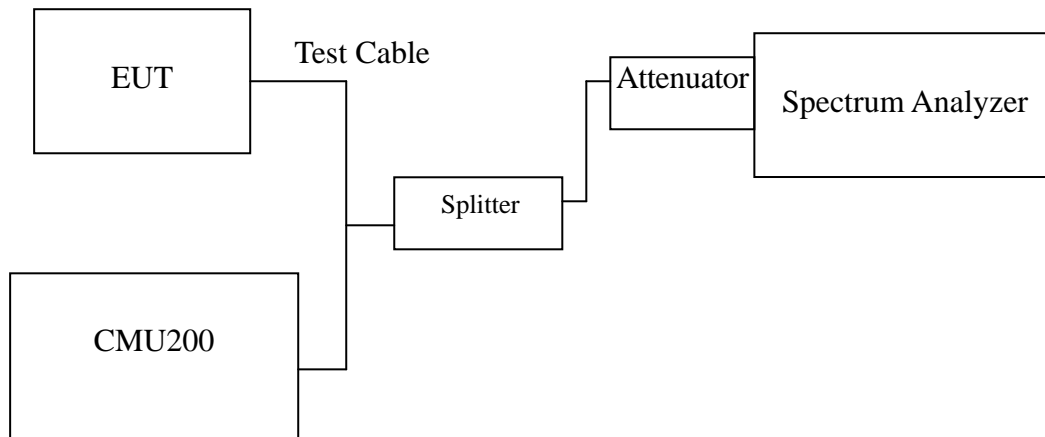


## 7.4 OCCUPIED BANDWIDTH MEASUREMENT

### LIMIT

According to §FCC 2.1049.

### Test Configuration



**Remark:** Measurement setup for testing on Antenna connector

### TEST PROCEDURE

The EUT's output RF connector was connected with a short cable to the spectrum analyzer, RBW was set to about 1% of emission BW, VBW is set to 3 times the RBW, -26dBc display line was placed on the screen (or 99% bandwidth), the occupied bandwidth is the delta frequency between the two points where the display line intersects the signal trace.

### TEST RESULTS

*No non-compliance noted*

**Test Data**

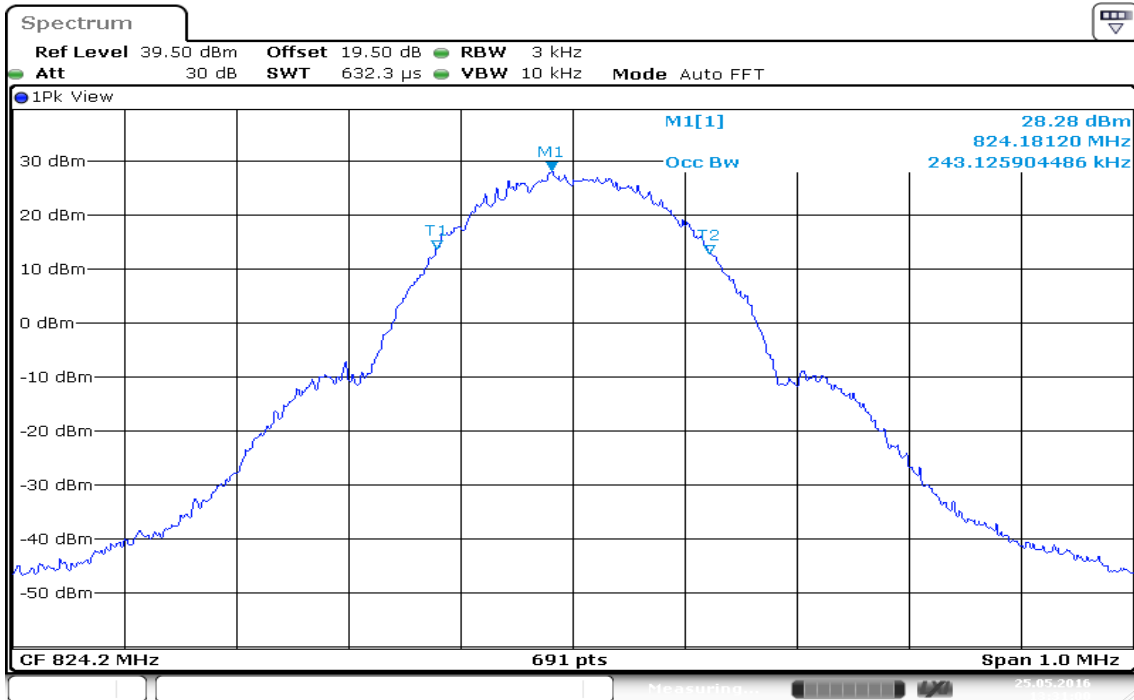
Test Mode	CH	Frequency (MHz)	99% Bandwidth (kHz)
GPRS 850	128	824.20	243.1259
	190	836.60	<b>*244.5730</b>
	251	848.80	243.1259
EDGE 850	128	824.20	<b>*243.1259</b>
	190	836.60	243.1259
	251	848.80	240.2315

Test Mode	CH	Frequency (MHz)	99% Bandwidth (kHz)
GPRS 1900	512	1850.20	<b>*244.5730</b>
	661	1880.00	244.5730
	810	1909.80	244.5730
EDGE 1900	512	1850.20	<b>*246.0202</b>
	661	1880.00	244.5730
	810	1909.80	243.1259

Test Mode	CH	Frequency (MHz)	99% Bandwidth (MHz)
WCDMA (Band II)	9262	1852.40	4.1534
	9400	1880.00	<b>*4.1823</b>
	9538	1907.60	4.1823
WCDMA (Band V)	4132	826.40	<b>*4.1678</b>
	4182	836.40	4.1678
	4233	846.60	4.1678
HSDPA (BAND II)	9262	1852.40	<b>*4.1823</b>
	9400	1880.00	4.1678
	9538	1907.60	4.1823
HSDPA (BAND V)	4132	826.40	<b>*4.1678</b>
	4182	836.40	4.1678
	4233	846.60	4.1534
HSUPA (BAND II)	9262	1852.40	<b>*4.1823</b>
	9400	1880.00	4.1823
	9538	1907.60	4.1678
HSUPA (BAND V)	4132	826.40	<b>*4.1823</b>
	4182	836.40	4.1678
	4233	846.60	4.1823

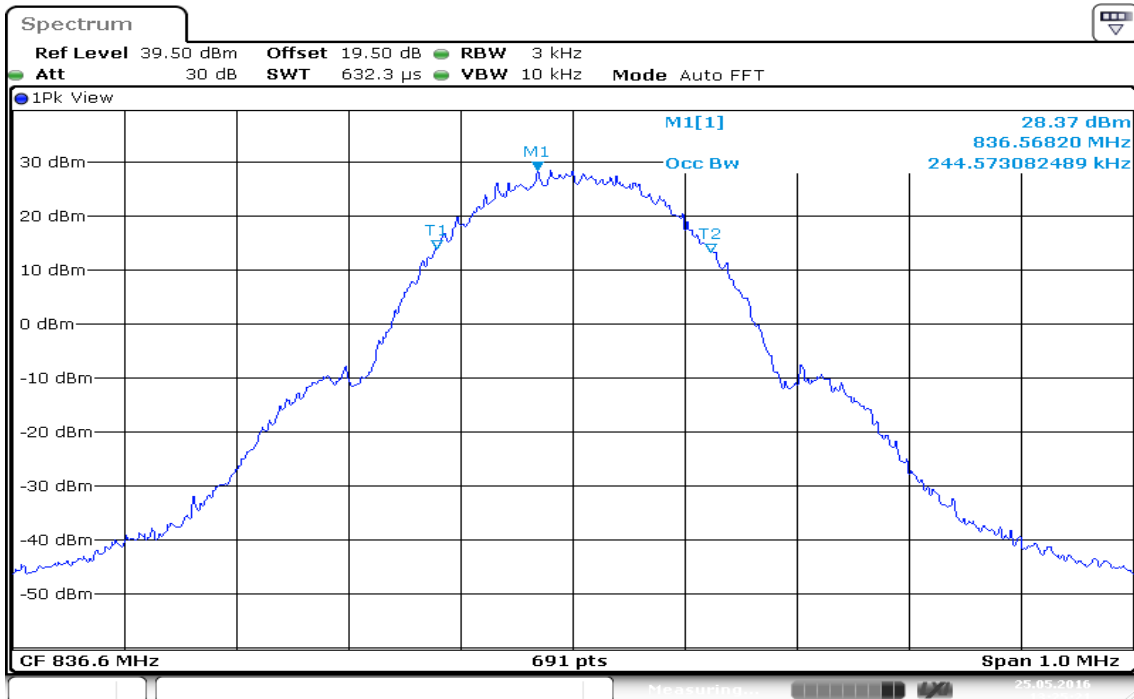
**Test Plot**

**GPRS 850 (CH Low)**



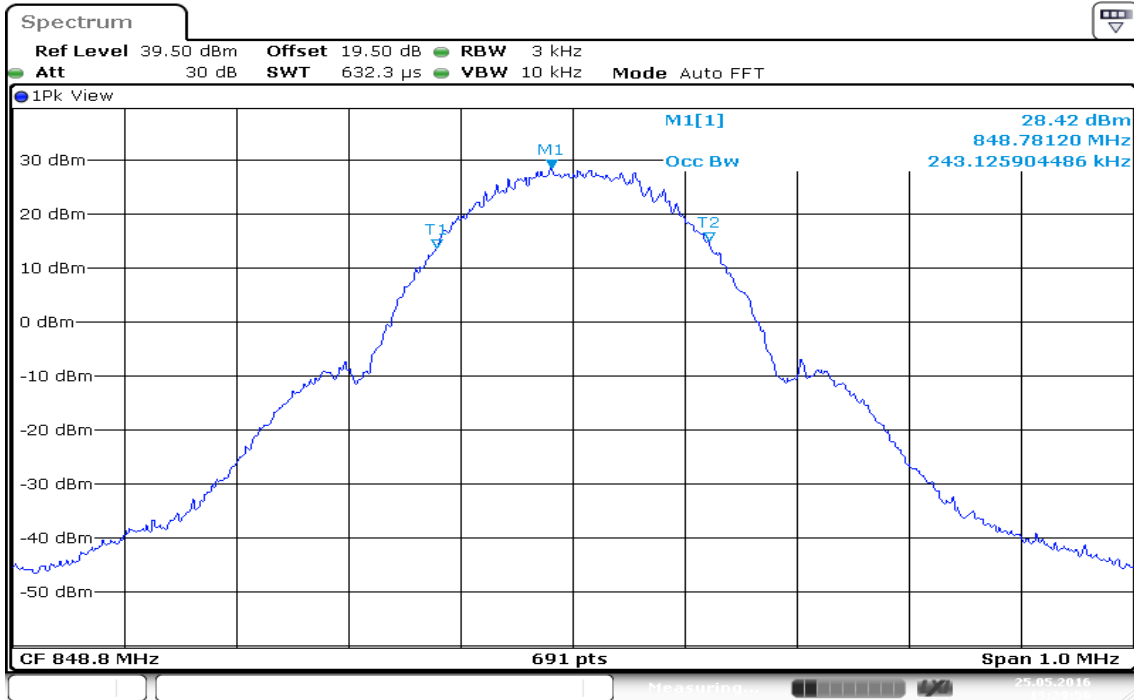
Date: 25 MAY 2016 13:31:00

**GPRS 850 (CH Mid)**



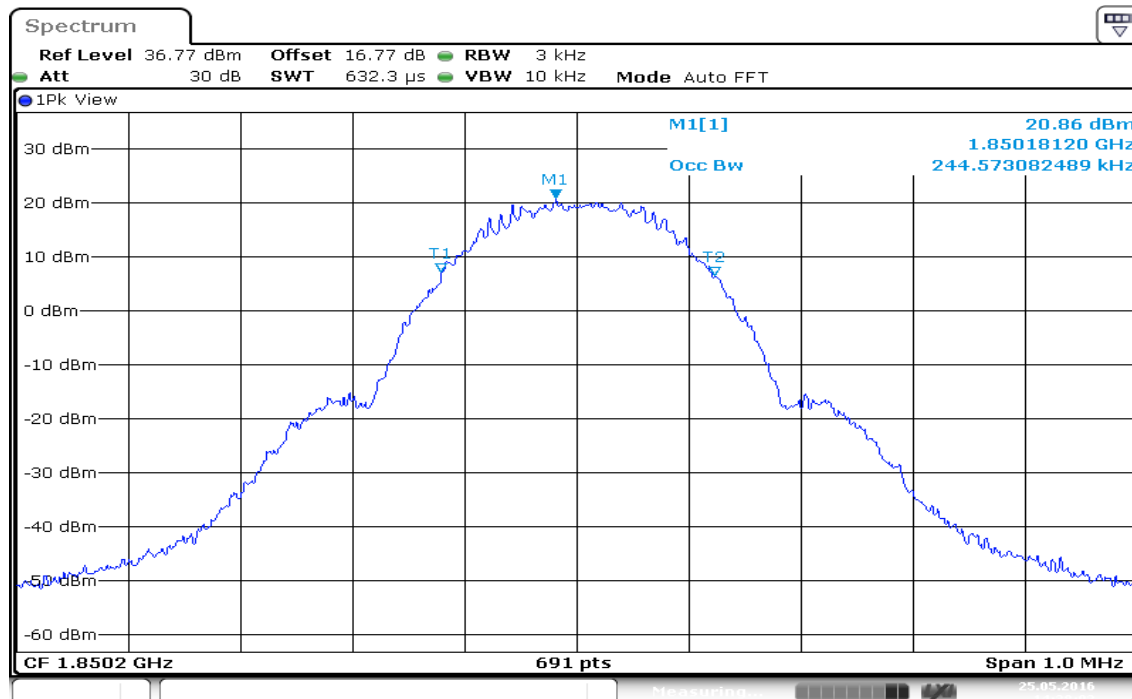
Date: 25 MAY 2016 13:25:21

### GPRS 850(CH High)



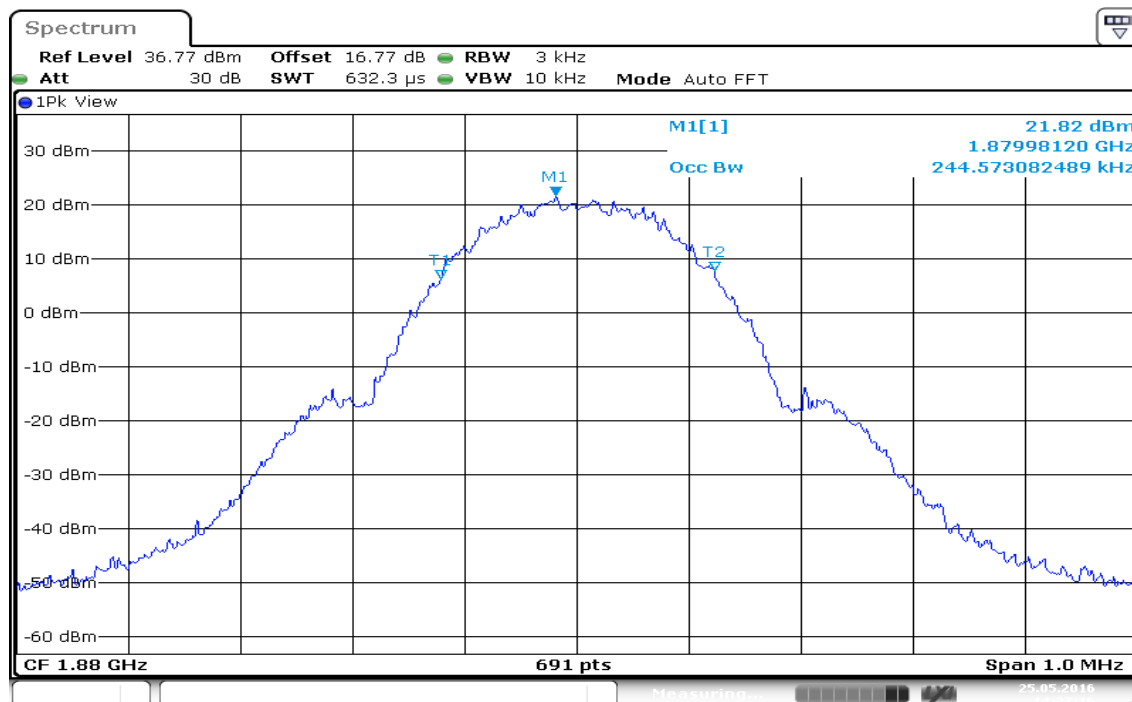
Date: 25 MAY 2016 13:29:56

### GPRS 1900 (CH Low)



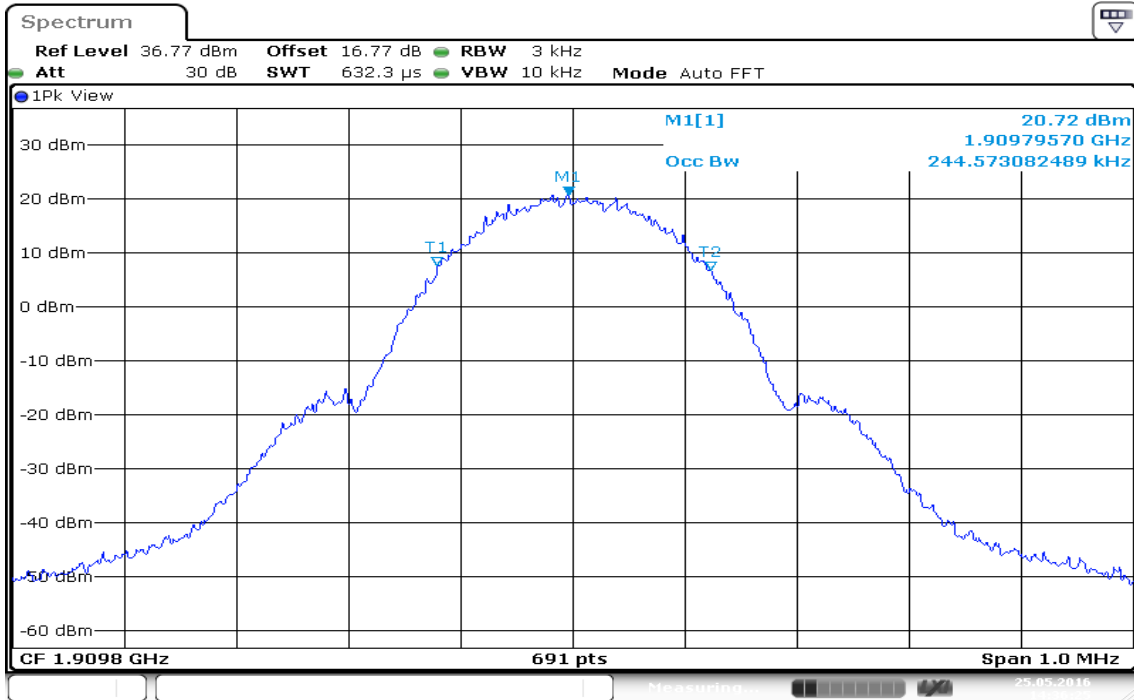
Date: 25 MAY 2016 14:38:02

### GPRS 1900 (CH Mid)



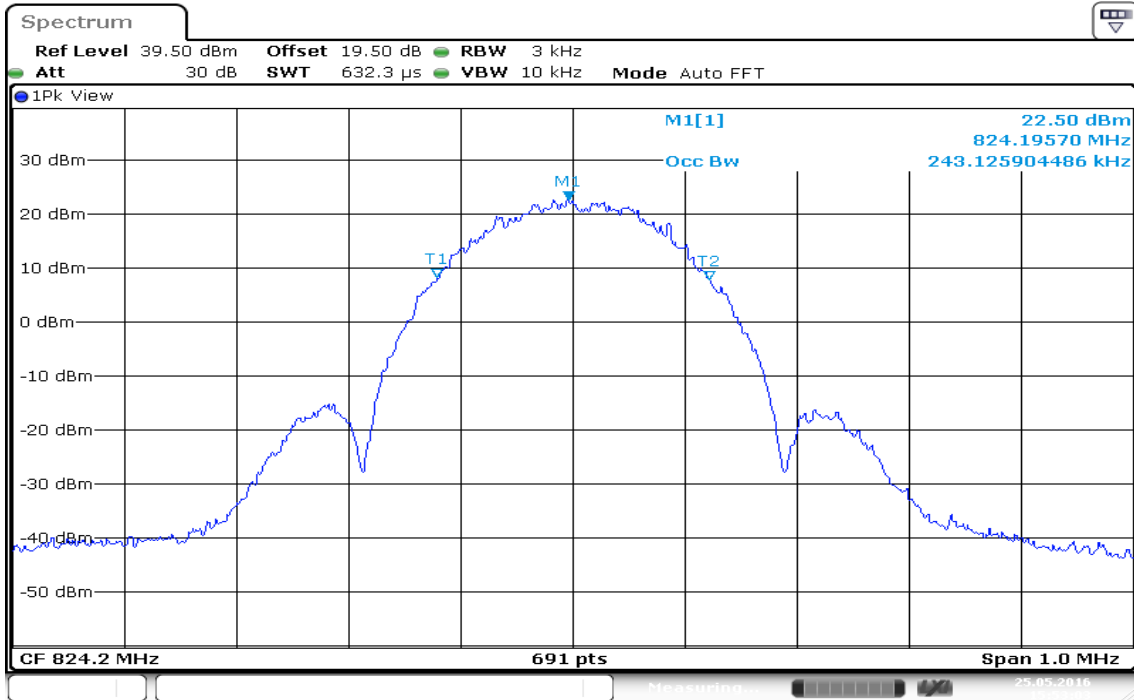
Date: 25 MAY 2016 14:37:16

### GPRS 1900 (CH High)

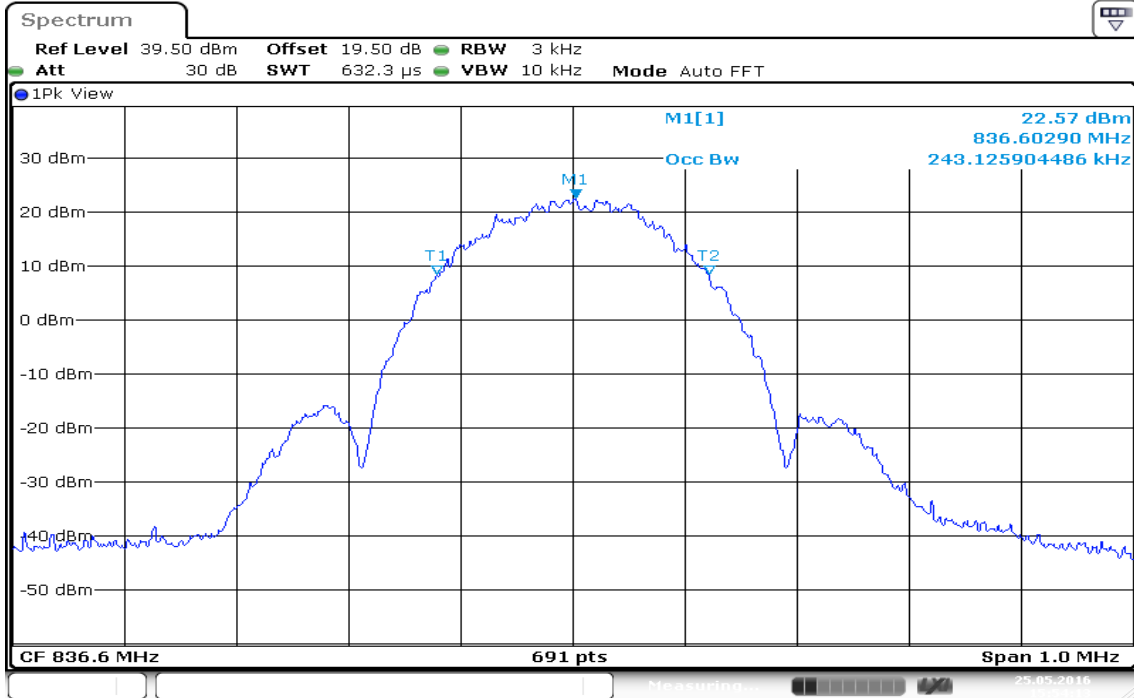


Date: 25 MAY 2016 14:36:25

### EDGE 850 (CH Low)

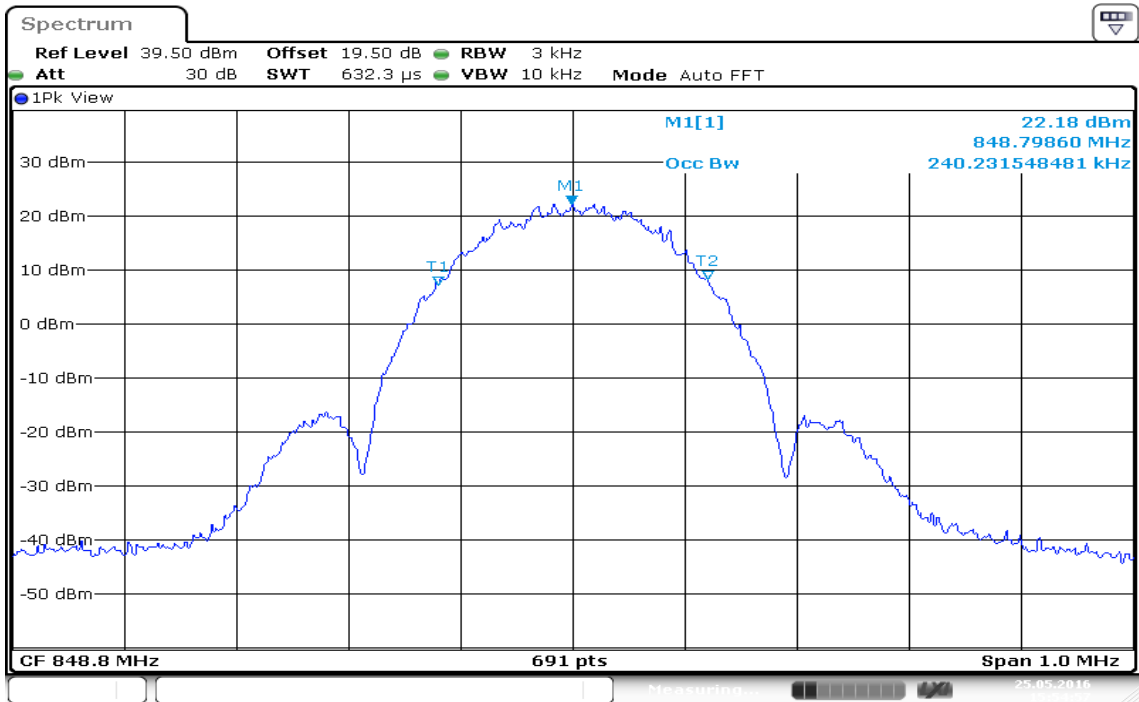


### EDGE 850 (CH Mid)



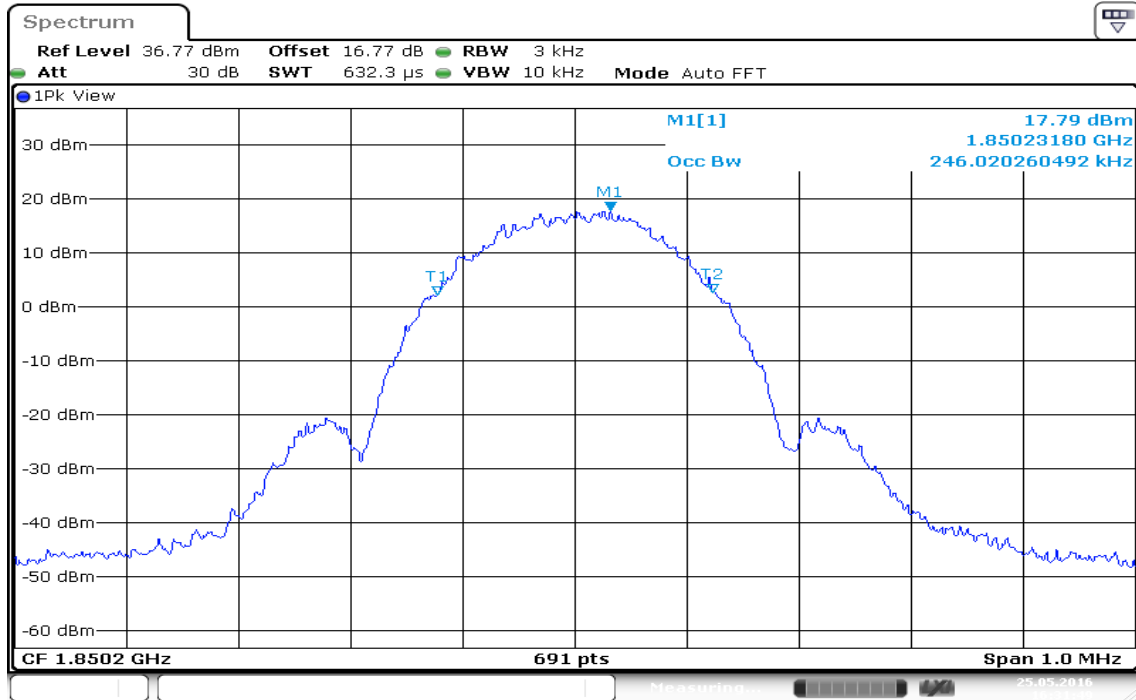


### EDGE 850 (CH High)

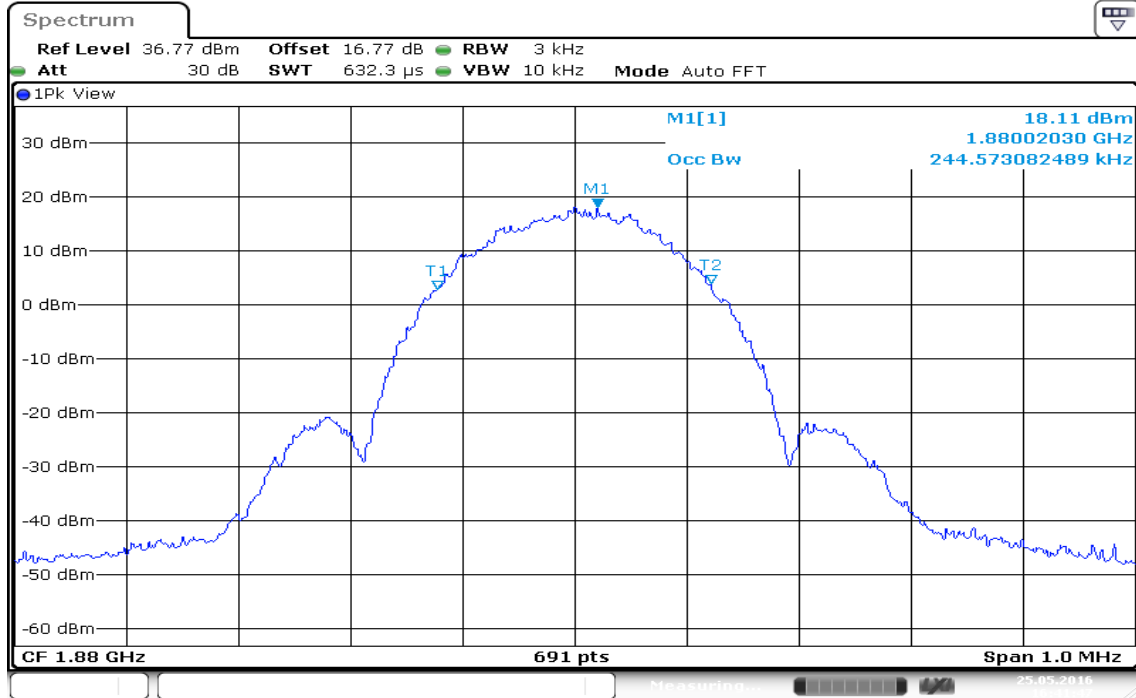


Date: 25 MAY 2016 15:54:57

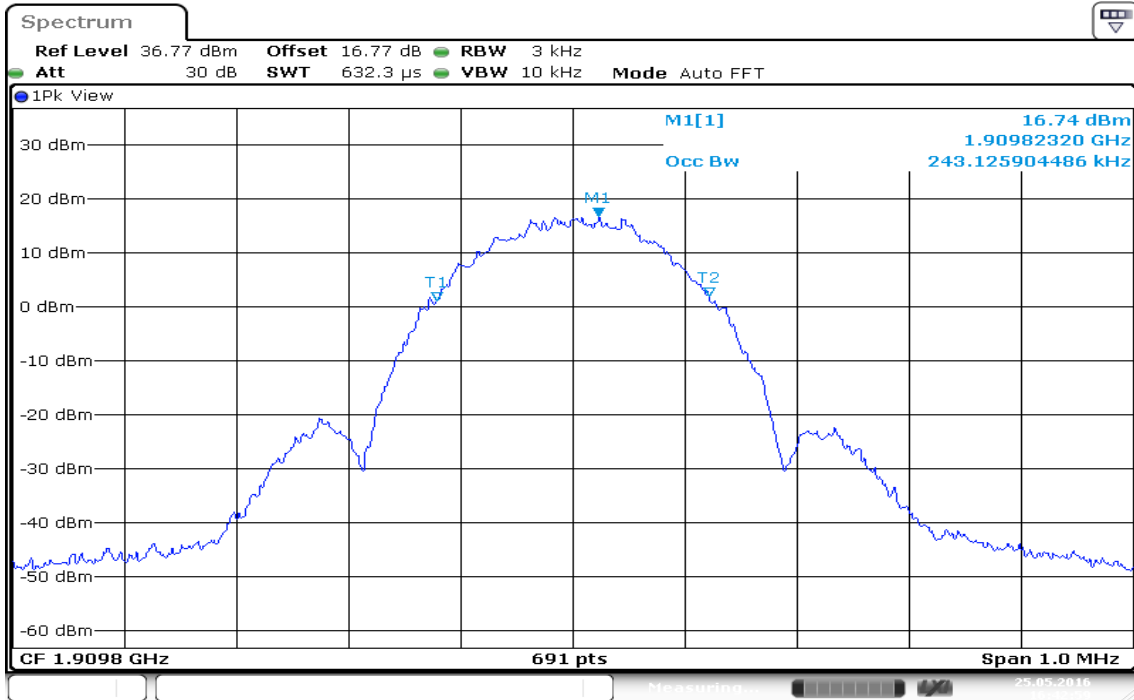
### EDGE 1900 (CH Low)



### EDGE 1900 (CH Mid)

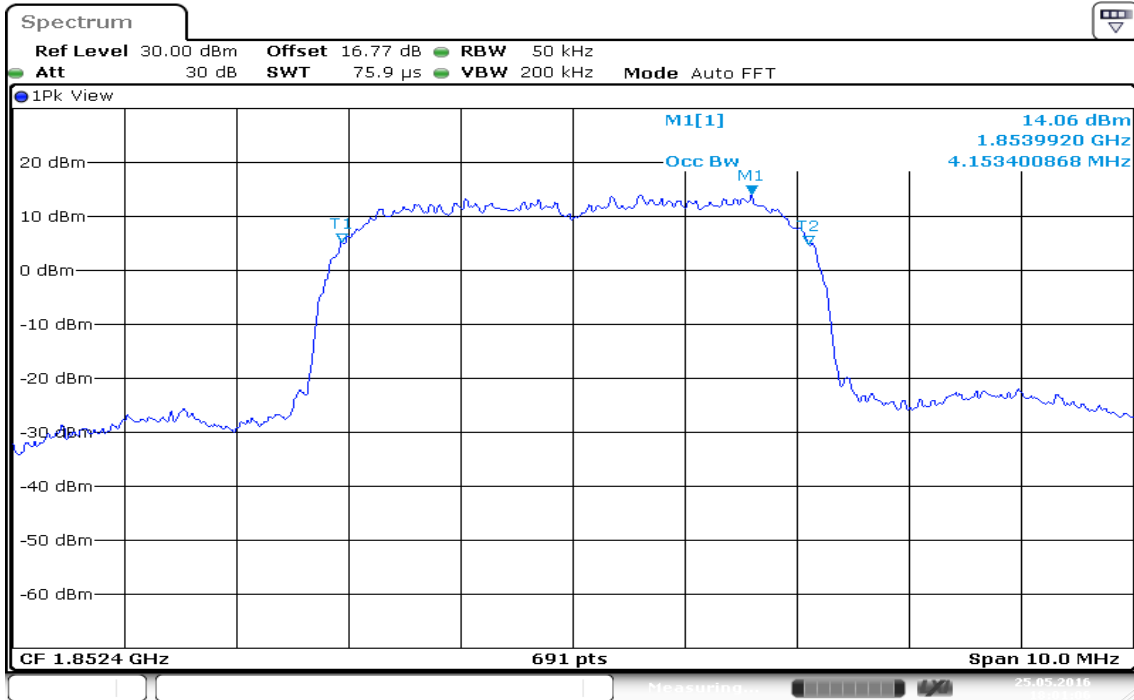


### EDGE 1900 (CH High)



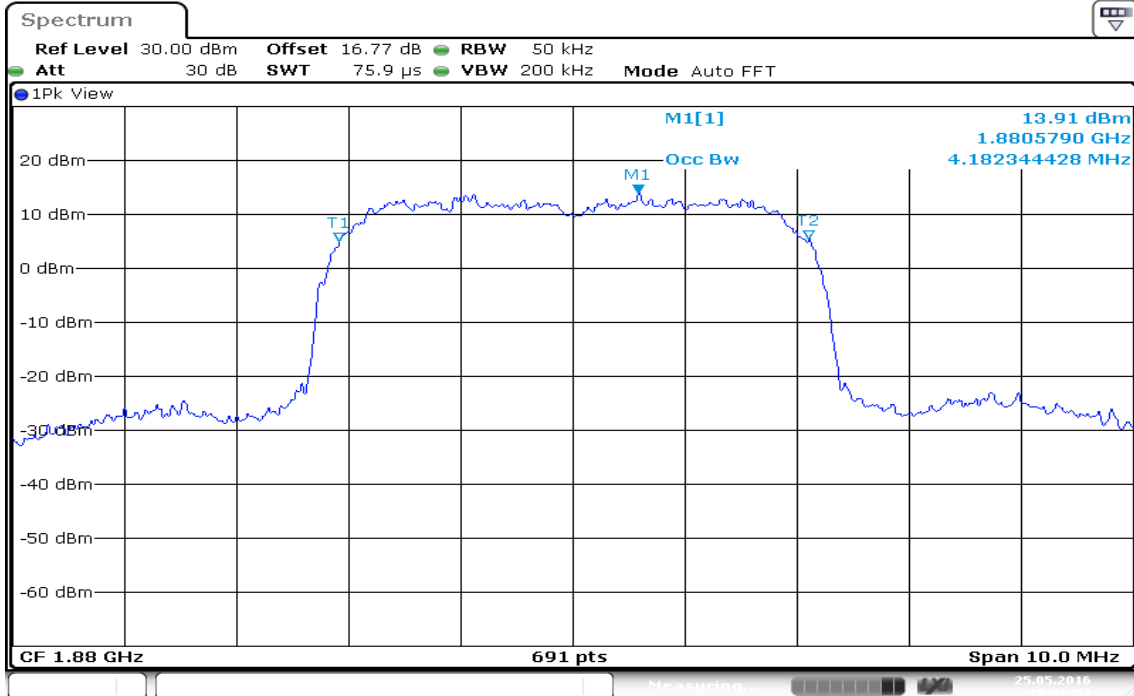
Date: 25 MAY 2016 16:42:58

### WCDMA Band II (CH Low)



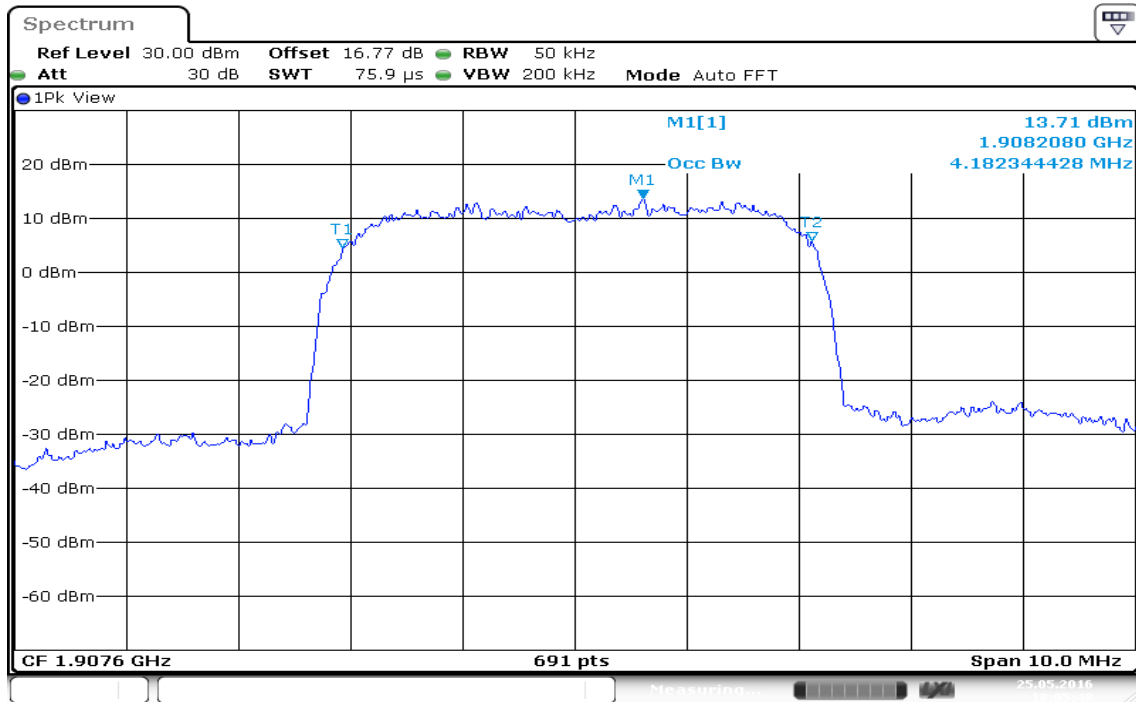
Date: 25 MAY 2016 18:01:07

### WCDMA Band II (CH Mid)



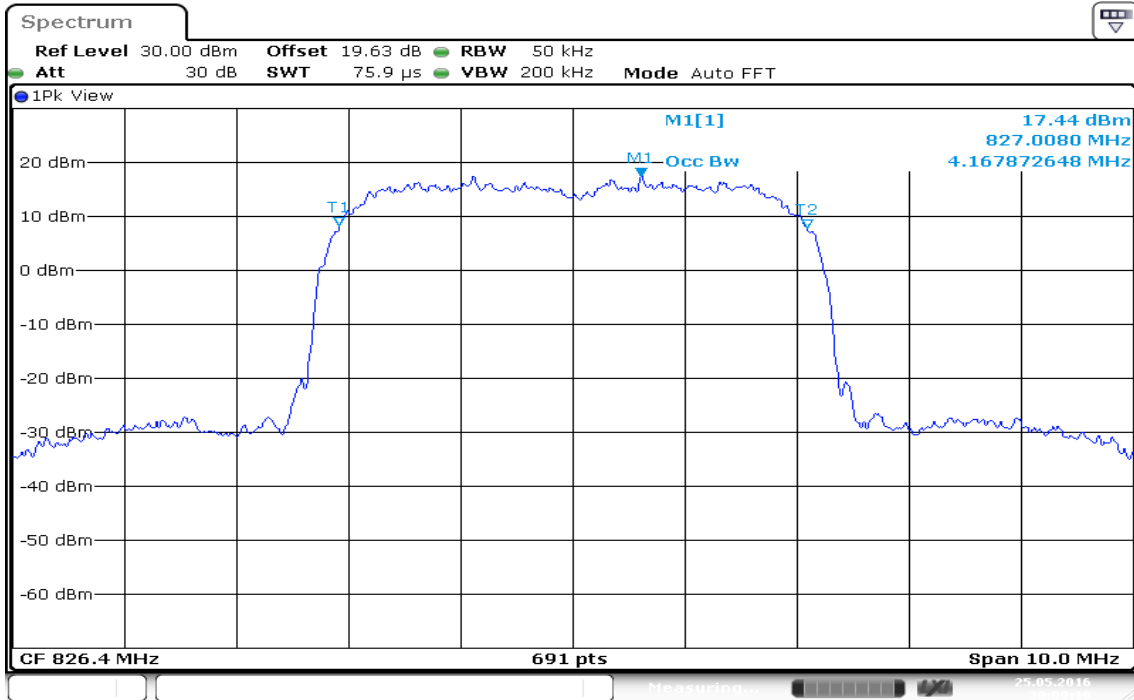
Date: 25 MAY 2016 18:02:53

### WCDMA Band II (CH High)



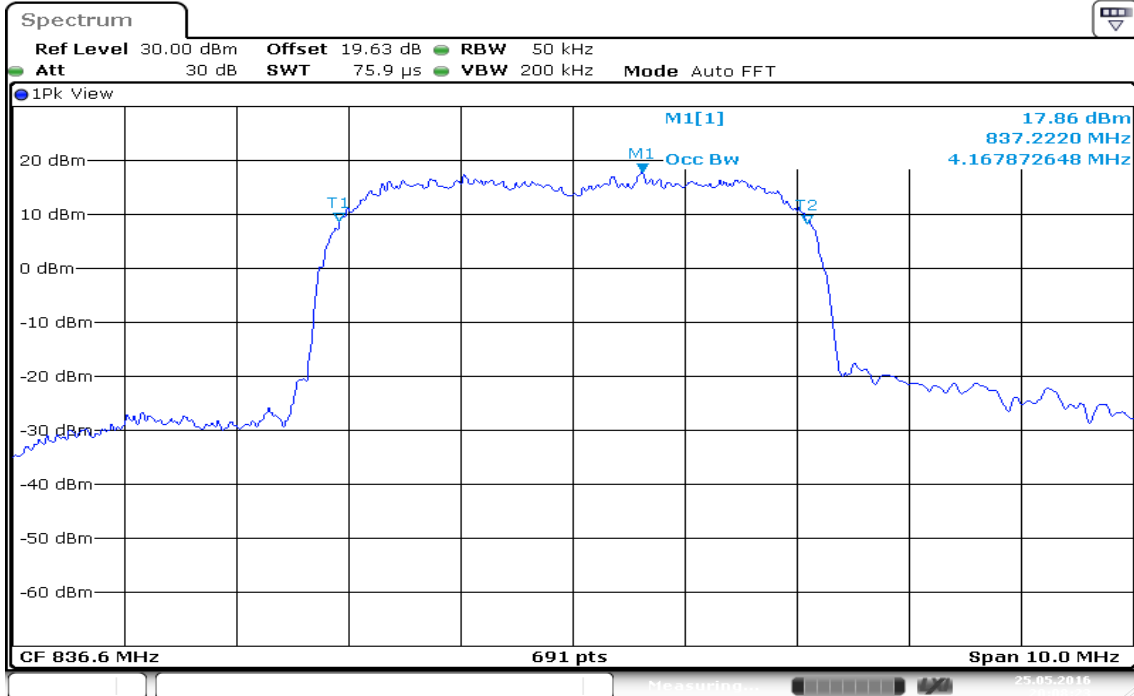
Date: 25 MAY 2016 18:05:48

### WCDMA Band V (CH Low)



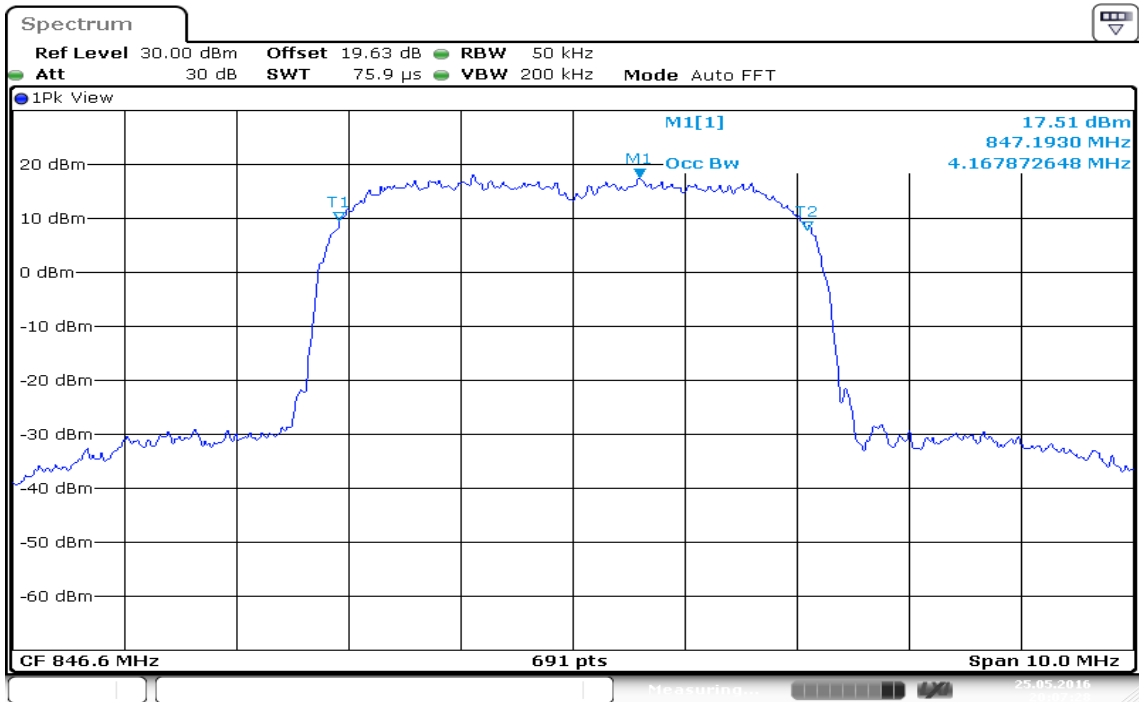
Date: 25 MAY 2016 20:09:19

### WCDMA Band V (CH Mid)



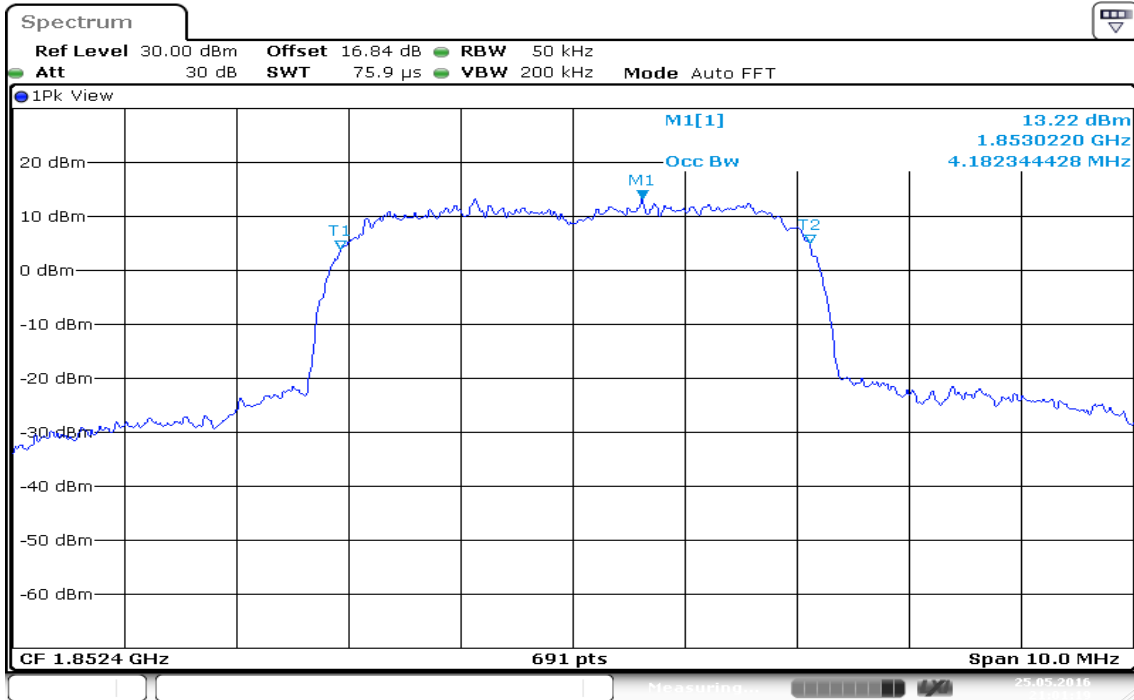
Date: 25 MAY 2016 20:08:23

### WCDMA Band V (CH High)



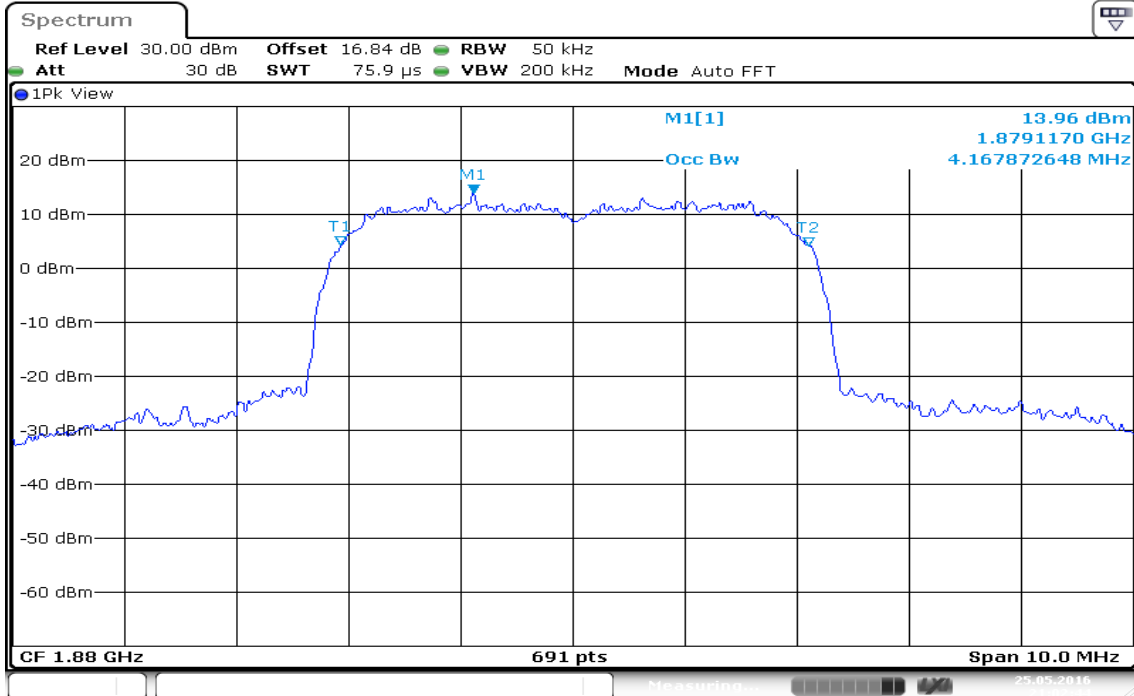
Date: 25 MAY 2016 20:07:28

### HSDPA Band II (CH Low)



Date: 25 MAY 2016 21:01:19

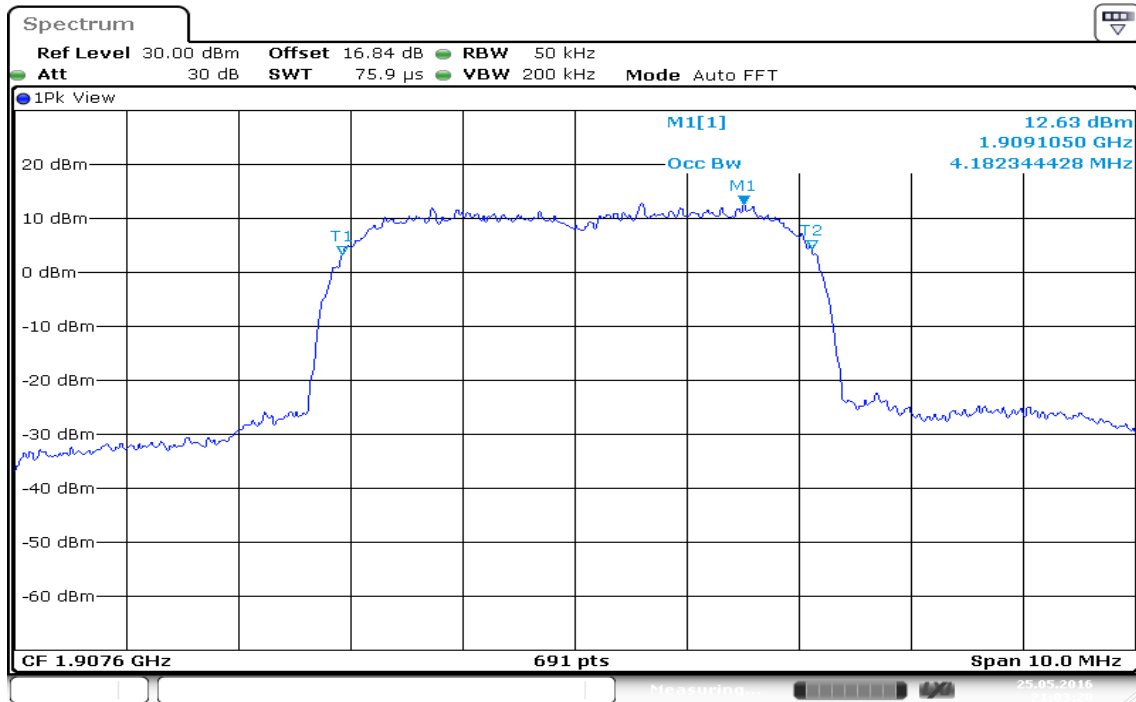
### HSDPA Band II (CH Mid)



Date: 25 MAY 2016 21:02:44

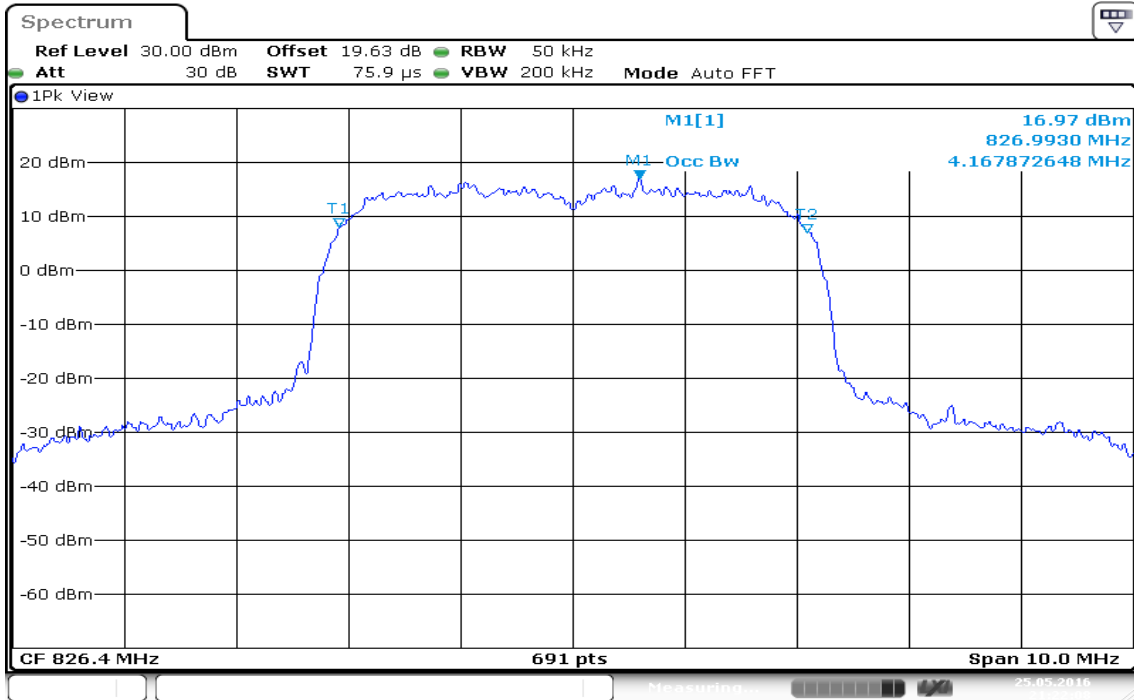


### HSDPA Band II (CH High)

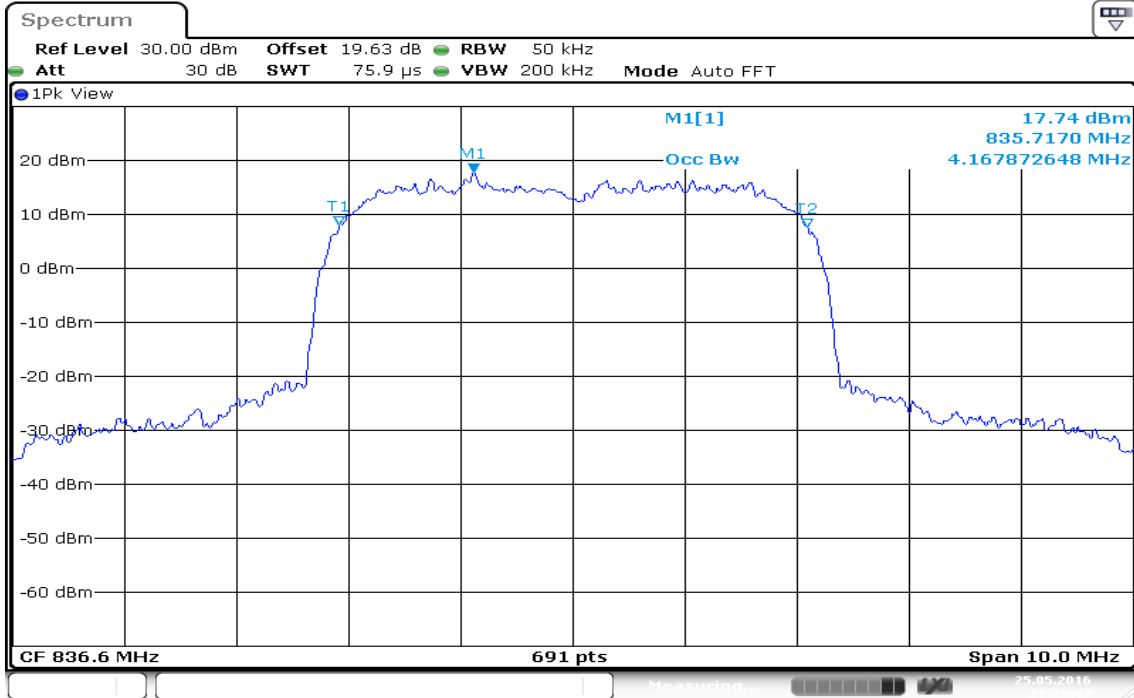


Date: 25 MAY 2016 21:03:20

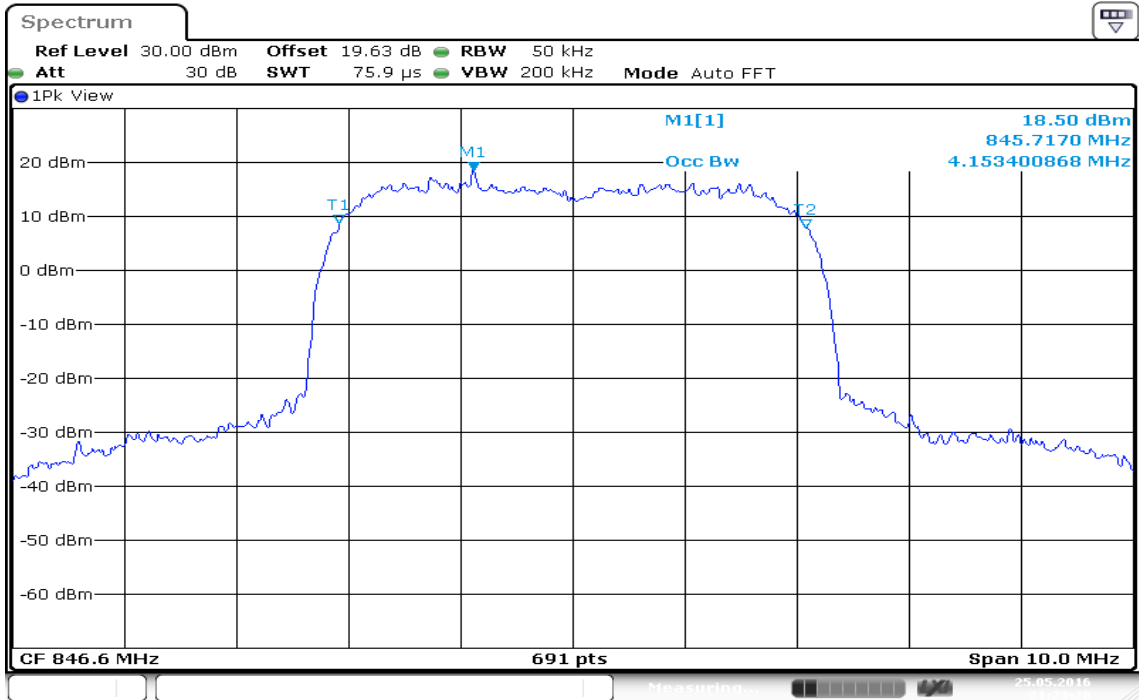
### HSDPA Band V (CH Low)



### HSDPA Band V (CH Mid)

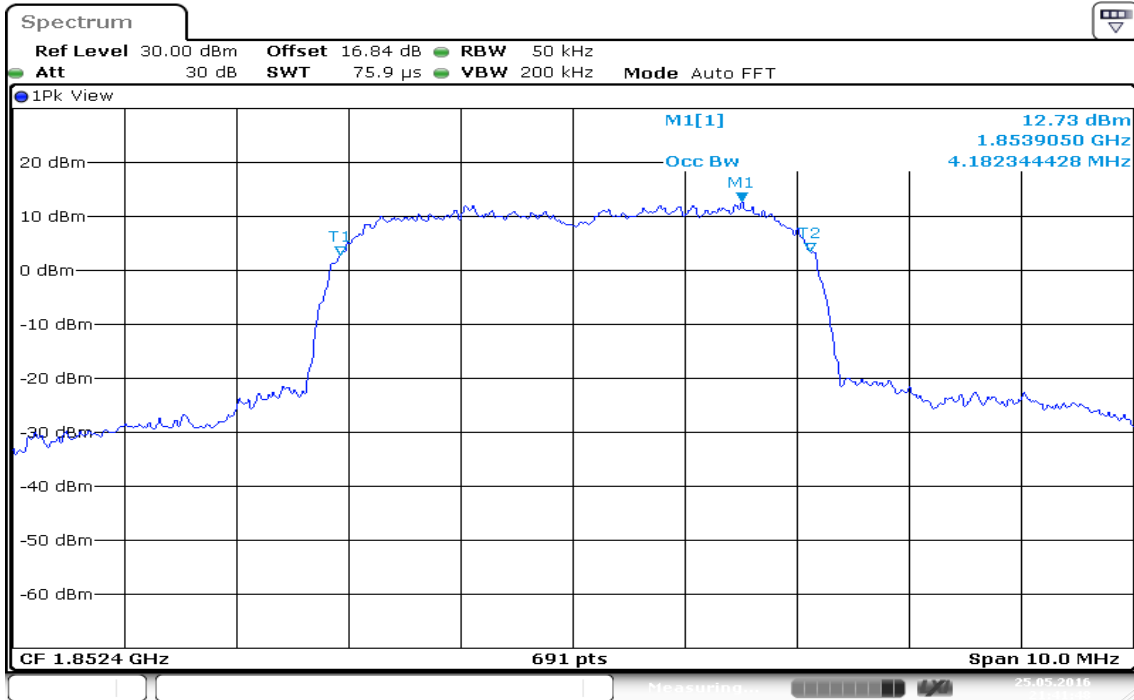


### HSDPA Band V (CH High)



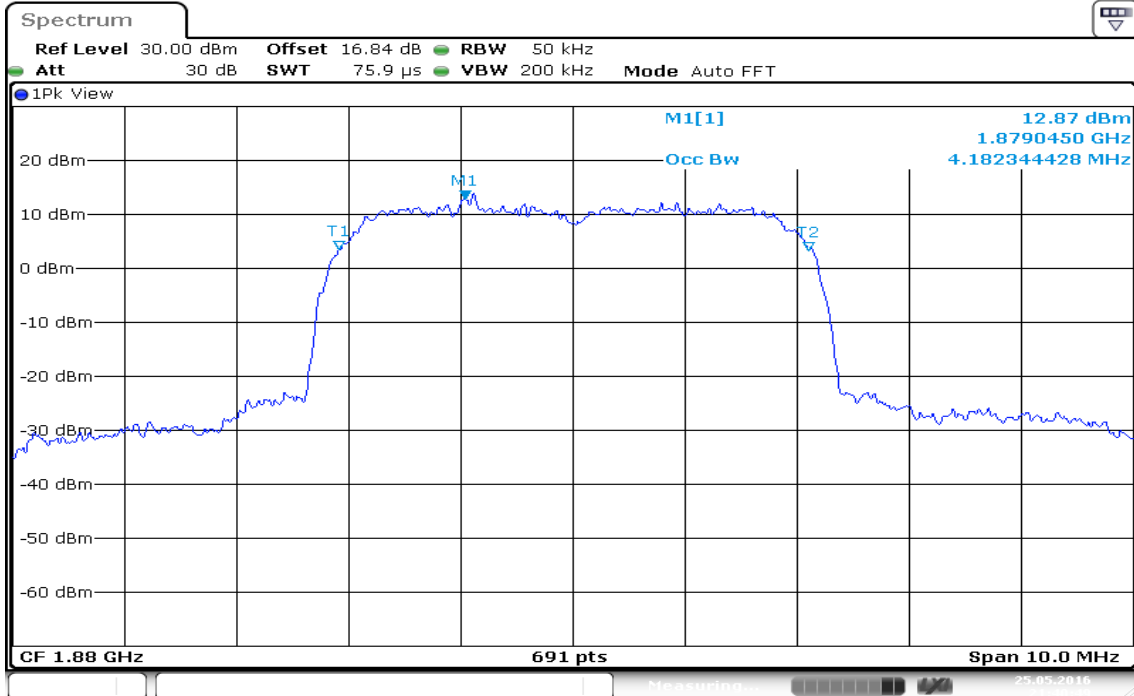
Date: 25 MAY 2016 21:23:20

### HSUPA Band II (CH Low)



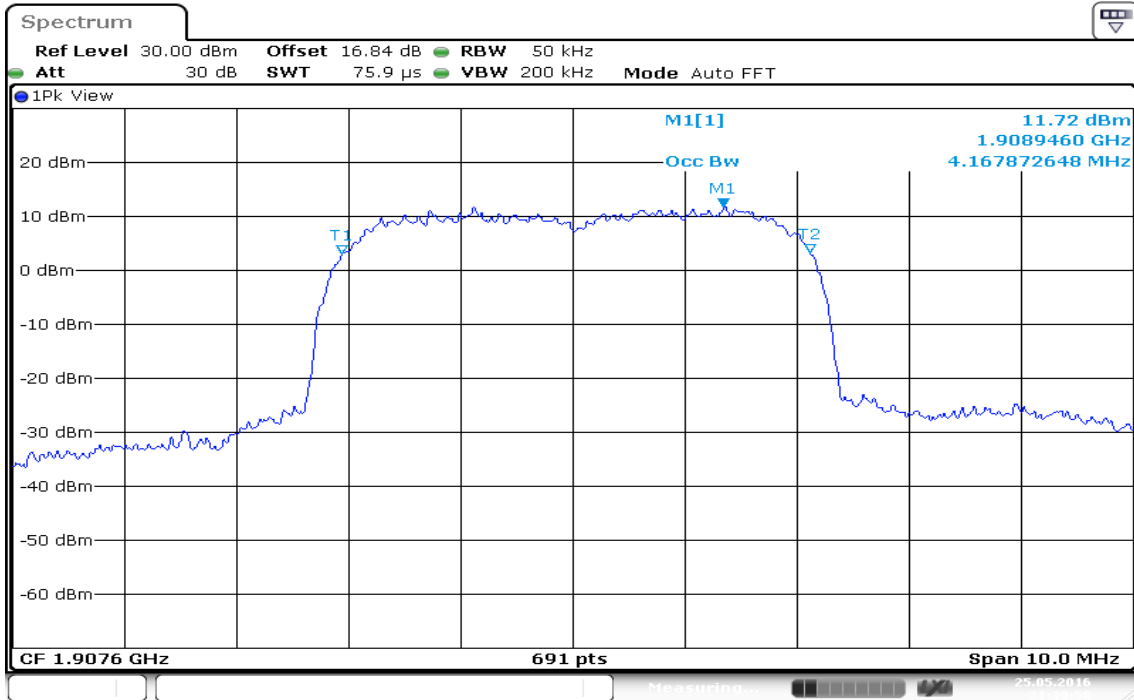
Date: 25 MAY 2016 21:41:49

### HSUPA Band II (CH Mid)



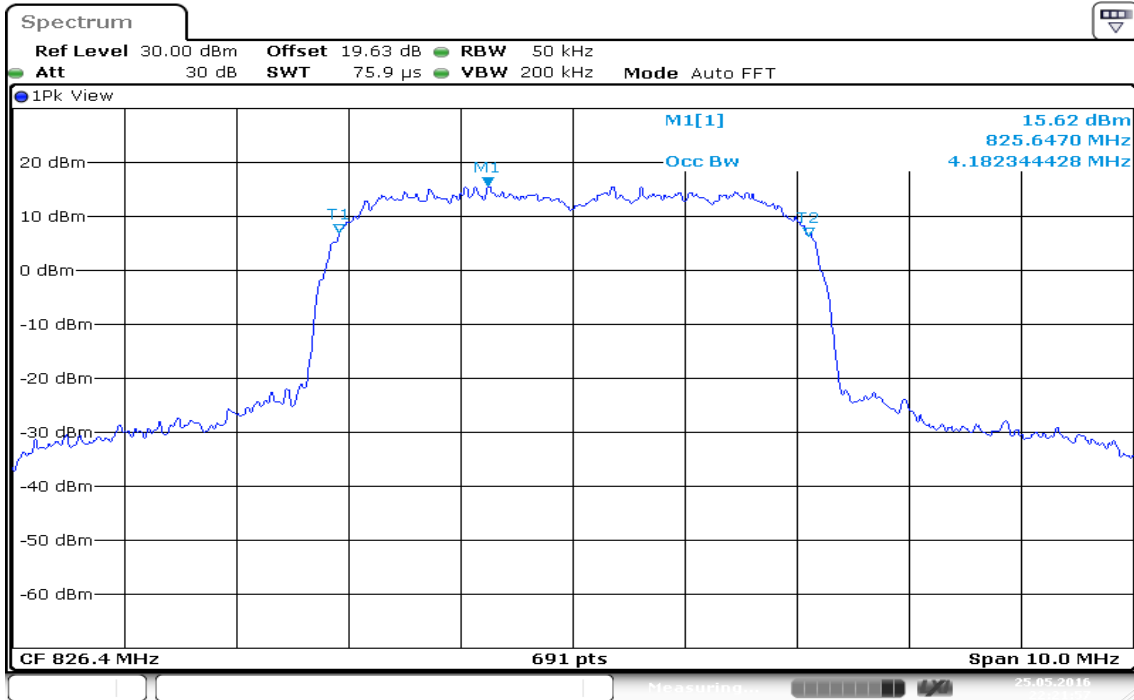
Date: 25 MAY 2016 21:40:49

### HSUPA Band II (CH High)

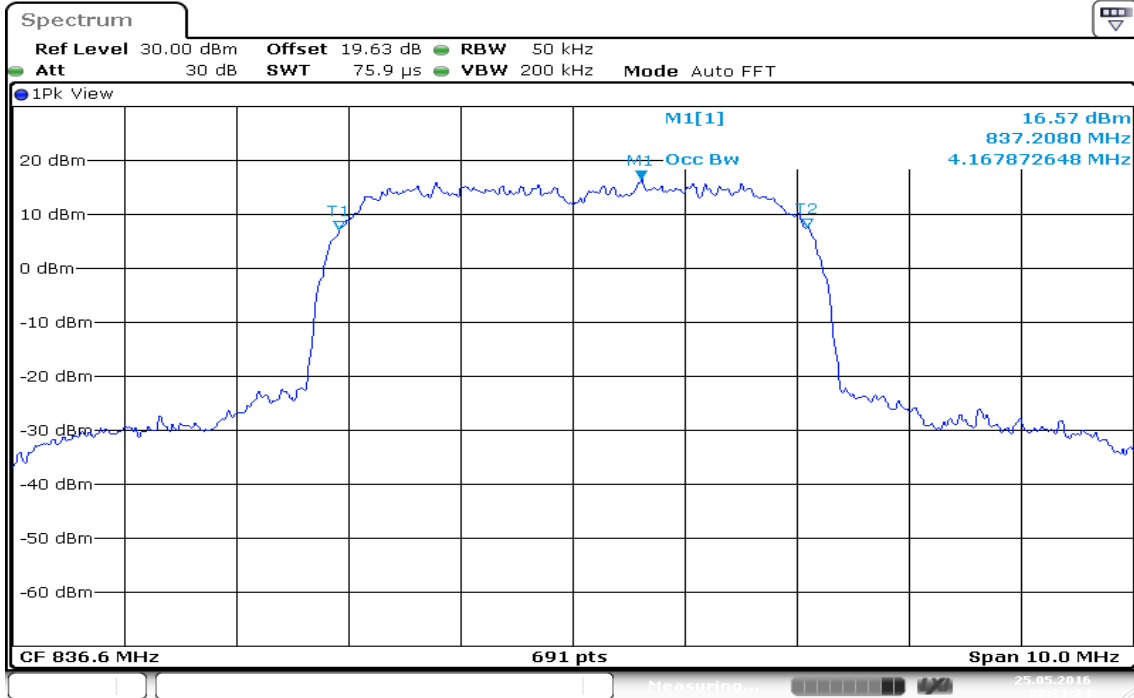


Date: 25 MAY 2016 21:39:58

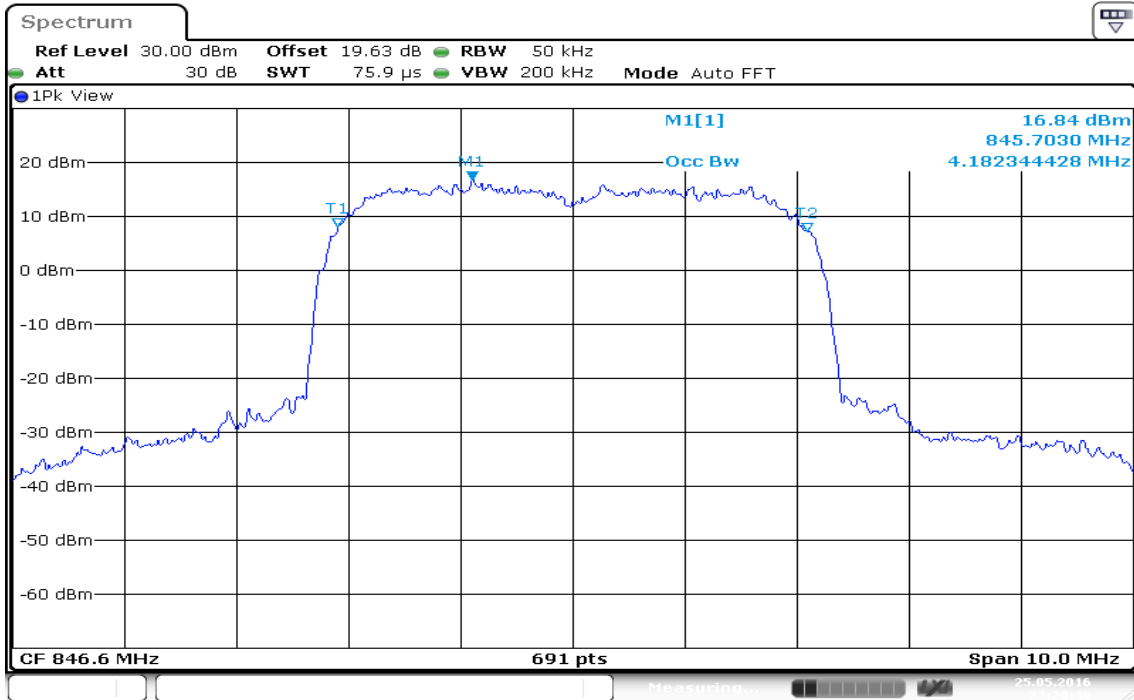
### HSUPA Band V (CH Low).



### HSUPA Band V (CH Mid)



### HSUPA Band V (CH Mid)



Date: 25 MAY 2016 22:20:46

## 7.5 OUT OF BAND EMISSION AT ANTENNA TERMINALS

### LIMIT

According to FCC §2.1051, FCC §22.917, FCC §24.238(a).

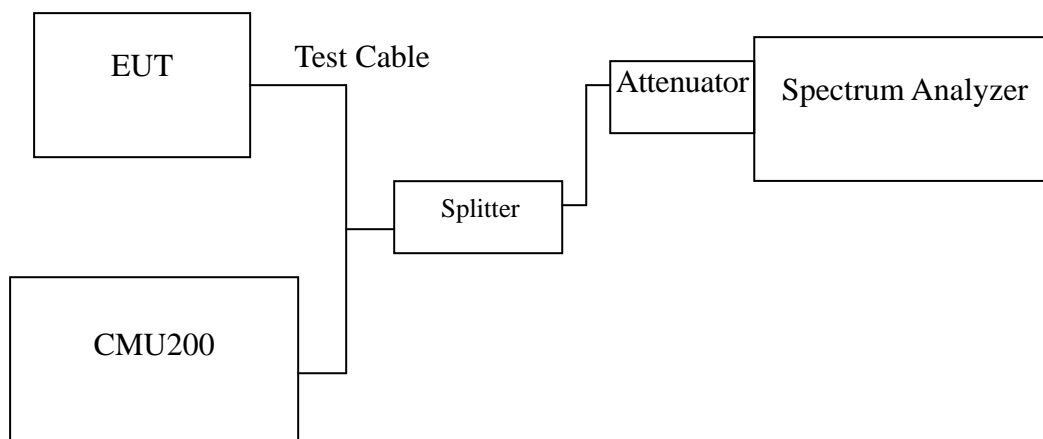
**Out of Band Emissions:** The mean power of emission must be attenuated below the mean power of the non-modulated carrier (P) on any frequency twice or more than twice the fundamental frequency by at least  $43 + 10 \log P$  dB.

**Mobile Emissions in Base Frequency Range:** The mean power of any emissions appearing in the base station frequency range from cellular mobile transmitters operated must be attenuated to a level not exceed  $-80$  dBm at the transmit antenna connector.

**Band Edge Requirements:** In the 1MHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of at least 1% of the emission bandwidth of the fundamental emission of the transmitter may be employed to measure the Out of band Emission

### Test Configuration

Out of band emission at antenna terminals:



### TEST PROCEDURE

The RF output of the transceiver was connected to a spectrum analyzer through appropriate attenuation. The resolution bandwidth of the spectrum analyzer was set at 1MHz, sufficient scans were taken to show the out of band Emissions if any up to 10th harmonic.

For the out of band: Set the RBW, VBW = 1MHz, Start=30MHz, Stop= 10 th harmonic. Limit = -13dBm

Band Edge Requirements (824 MHz and 849 MHz /1850MHz and 1910MHz): In the 1 MHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of at least 1 percent of the emission bandwidth of the fundamental emission of the transmitter may be employed to measure the out of band Emissions. Limit, -13dBm.

### TEST RESULTS

*No non-compliance noted.*



**Test Data**

Mode	CH	Location	Description
GPRS 850	128	Figure 8-1	Conducted spurious emissions, 30MHz - 20GHz
	190	Figure 8-2	Conducted spurious emissions, 30MHz - 20GHz
	251	Figure 8-3	Conducted spurious emissions, 30MHz - 20GHz

Mode	CH	Location	Description
GPRS 1900	512	Figure 9-1	Conducted spurious emissions, 30MHz - 20GHz
	661	Figure 9-2	Conducted spurious emissions, 30MHz - 20GHz
	810	Figure 9-3	Conducted spurious emissions, 30MHz - 20GHz

Mode	CH	Location	Description
GPRS 850	128	Figure 10-1	Band Edge emissions
	251	Figure 10-2	Band Edge emissions

Mode	CH	Location	Description
GPRS 1900	512	Figure 11-1	Band Edge emissions
	810	Figure 11-2	Band Edge emissions

Mode	CH	Location	Description
EDGE 850	128	Figure 12-1	Conducted spurious emissions, 30MHz - 20GHz
	190	Figure 12-2	Conducted spurious emissions, 30MHz - 20GHz
	251	Figure 12-3	Conducted spurious emissions, 30MHz - 20GHz
EDGE 1900	512	Figure 13-1	Conducted spurious emissions, 30MHz - 20GHz
	661	Figure 13-2	Conducted spurious emissions, 30MHz - 20GHz
	810	Figure 13-3	Conducted spurious emissions, 30MHz - 20GHz

Mode	CH	Location	Description
EDGE 850	128	Figure 14-1	Band Edge emissions
	251	Figure 14-2	Band Edge emissions
EDGE 1900	512	Figure 15-1	Band Edge emissions
	810	Figure 15-2	Band Edge emissions

Mode	CH	Location	Description
WCDMA (Band II)	9262	Figure 16-1	Conducted spurious emissions, 30MHz - 20GHz
	9400	Figure 16-2	Conducted spurious emissions, 30MHz - 20GHz
	9538	Figure 16-3	Conducted spurious emissions, 30MHz - 20GHz
WCDMA (Band V)	4132	Figure 17-1	Conducted spurious emissions, 30MHz - 20GHz
	4182	Figure 17-2	Conducted spurious emissions, 30MHz - 20GHz
	4233	Figure 17-3	Conducted spurious emissions, 30MHz - 20GHz

Mode	CH	Location	Description
WCDMA (Band II)	9262	Figure 18-1	Band Edge emissions
	9538	Figure 18-2	Band Edge emissions
WCDMA (Band V)	4132	Figure 19-1	Band Edge emissions
	4233	Figure 19-2	Band Edge emissions

Mode	CH	Location	Description
HSDPA (Band II)	9262	Figure 20-1	Conducted spurious emissions, 30MHz - 20GHz
	9400	Figure 20-2	Conducted spurious emissions, 30MHz - 20GHz
	9538	Figure 20-3	Conducted spurious emissions, 30MHz - 20GHz
HSDPA (Band V)	4132	Figure 21-1	Conducted spurious emissions, 30MHz - 20GHz
	4182	Figure 21-2	Conducted spurious emissions, 30MHz - 20GHz
	4233	Figure 21-3	Conducted spurious emissions, 30MHz - 20GHz

Mode	CH	Location	Description
HSDPA (Band II)	9262	Figure 22-1	Band Edge emissions
	9538	Figure 22-2	Band Edge emissions
HSDPA (Band V)	4132	Figure 23-1	Band Edge emissions
	4233	Figure 23-2	Band Edge emissions

Mode	CH	Location	Description
HSUPA (Band II)	9262	Figure 24-1	Conducted spurious emissions, 30MHz - 20GHz
	9400	Figure 24-2	Conducted spurious emissions, 30MHz - 20GHz
	9538	Figure 24-3	Conducted spurious emissions, 30MHz - 20GHz
HSUPA (Band V)	4132	Figure 25-1	Conducted spurious emissions, 30MHz - 20GHz
	4182	Figure 25-2	Conducted spurious emissions, 30MHz - 20GHz
	4233	Figure 25-3	Conducted spurious emissions, 30MHz - 20GHz

Mode	CH	Location	Description
HSUPA (Band II)	9262	Figure 26-1	Band Edge emissions
	9538	Figure 26-2	Band Edge emissions
HSUPA (Band V)	4132	Figure 27-1	Band Edge emissions
	4233	Figure 27-2	Band Edge emissions

**Test Plot**

**GPRS 850**

Figure 8-1: Out of Band emission at antenna terminals – GPRS CH Low

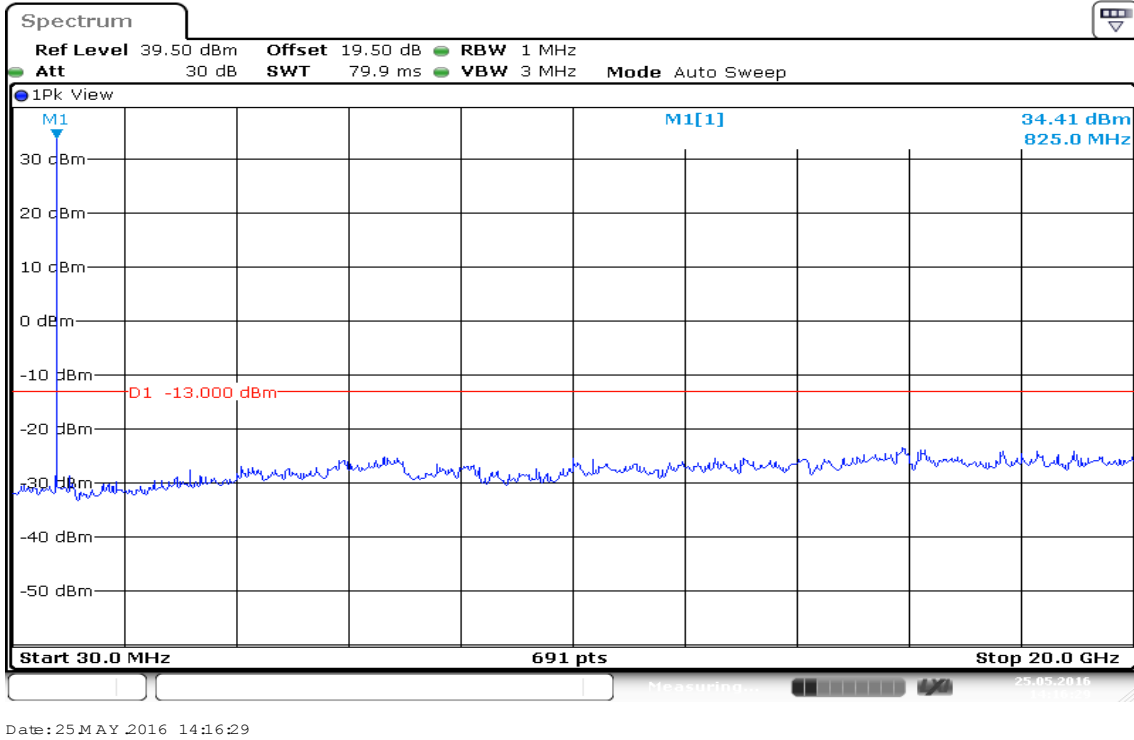


Figure 8-2: Out of Band emission at antenna terminals – GPRS CH Mid

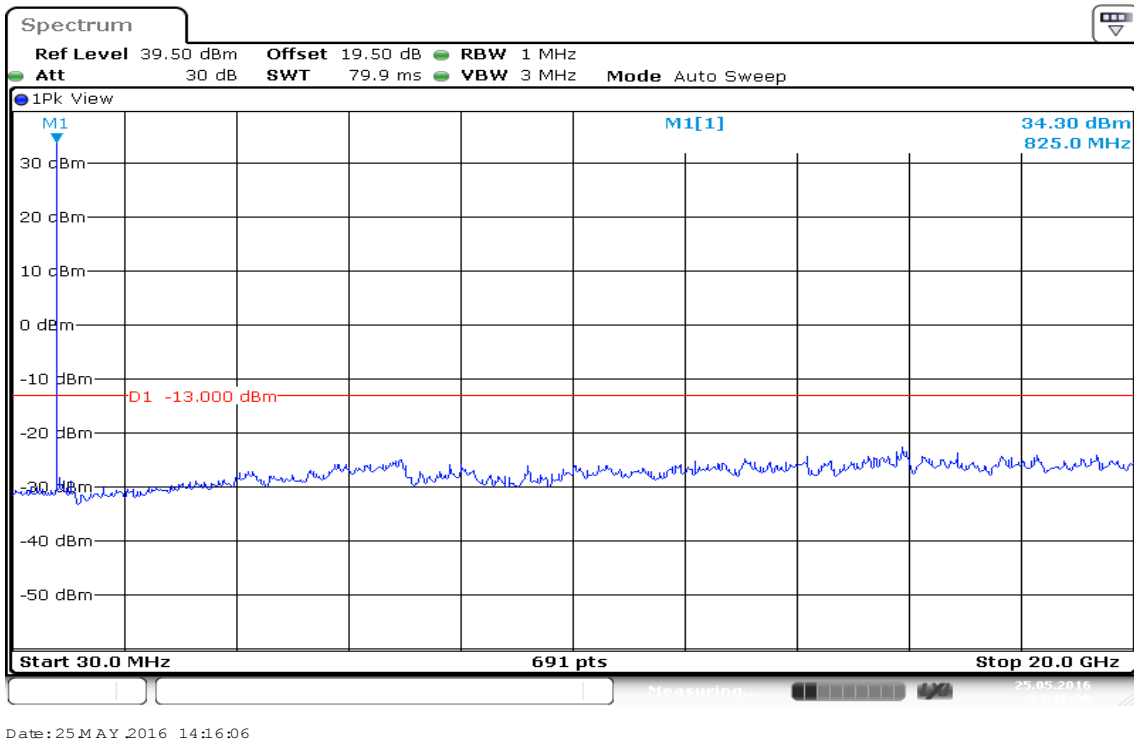
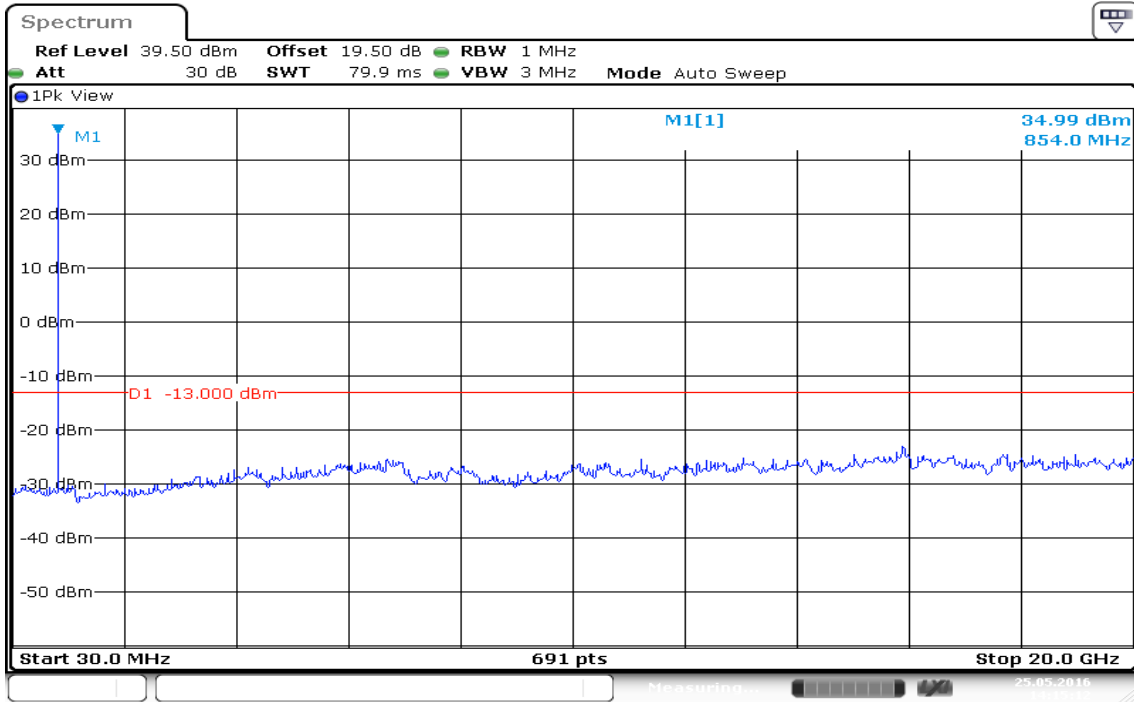


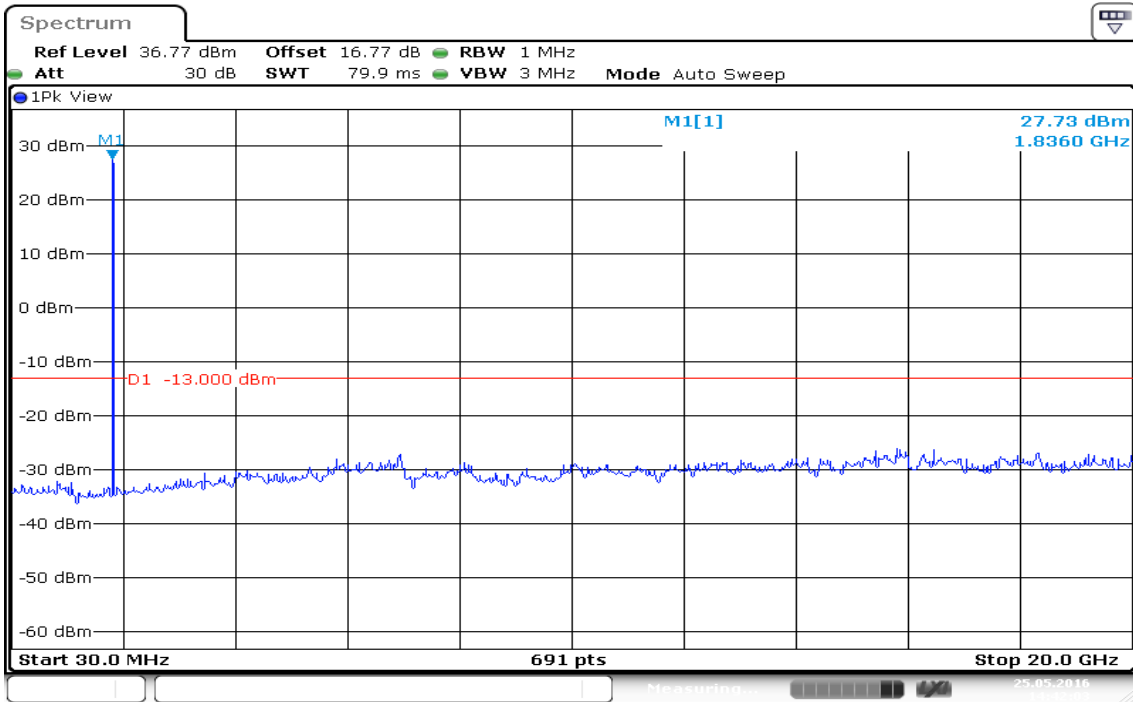
Figure 8-3: Out of Band emission at antenna terminals – GPRS CH High



Date: 25 MAY 2016 14:15:12

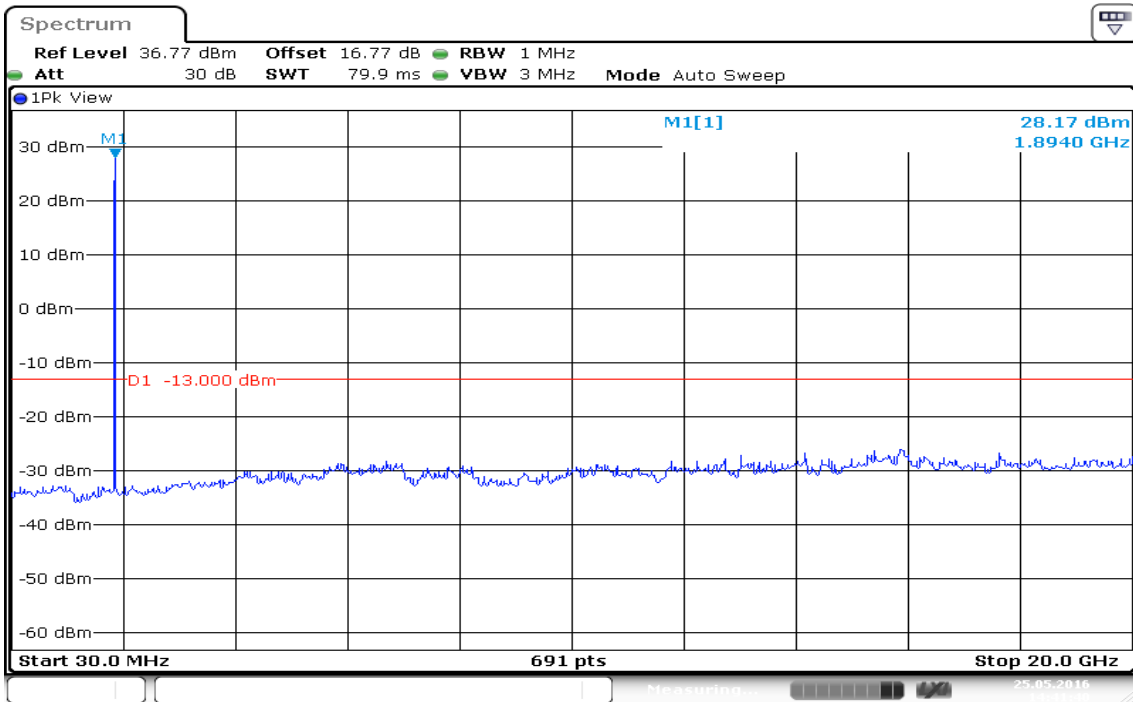
## GPRS 1900

Figure 9-1: Out of Band emission at antenna terminals – GPRS CH Low



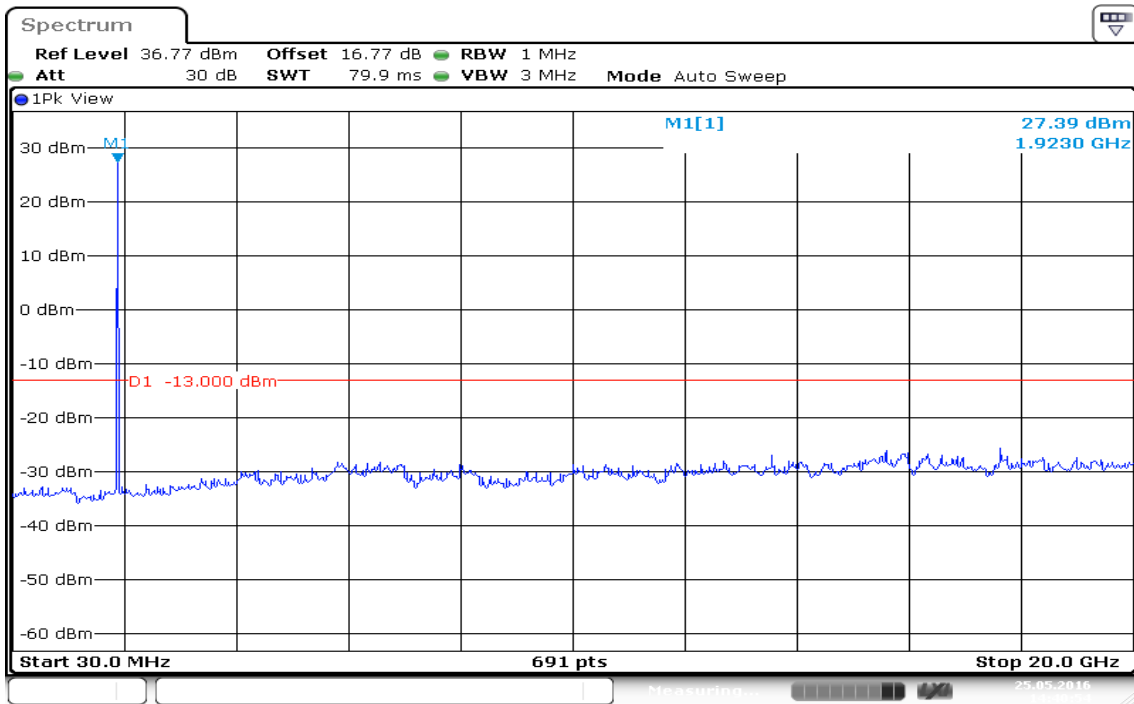
Date: 25 MAY 2016 14:42:03

Figure 9-2: Out of Band emission at antenna terminals – GPRS CH Mid



Date: 25 MAY 2016 14:41:40

Figure 9-3: Out of Band emission at antenna terminals – GPRS CH High



Date: 25 MAY 2016 14:40:54

## GPRS 850

Figure 10-1: Band Edge emissions – GPRS CH Low

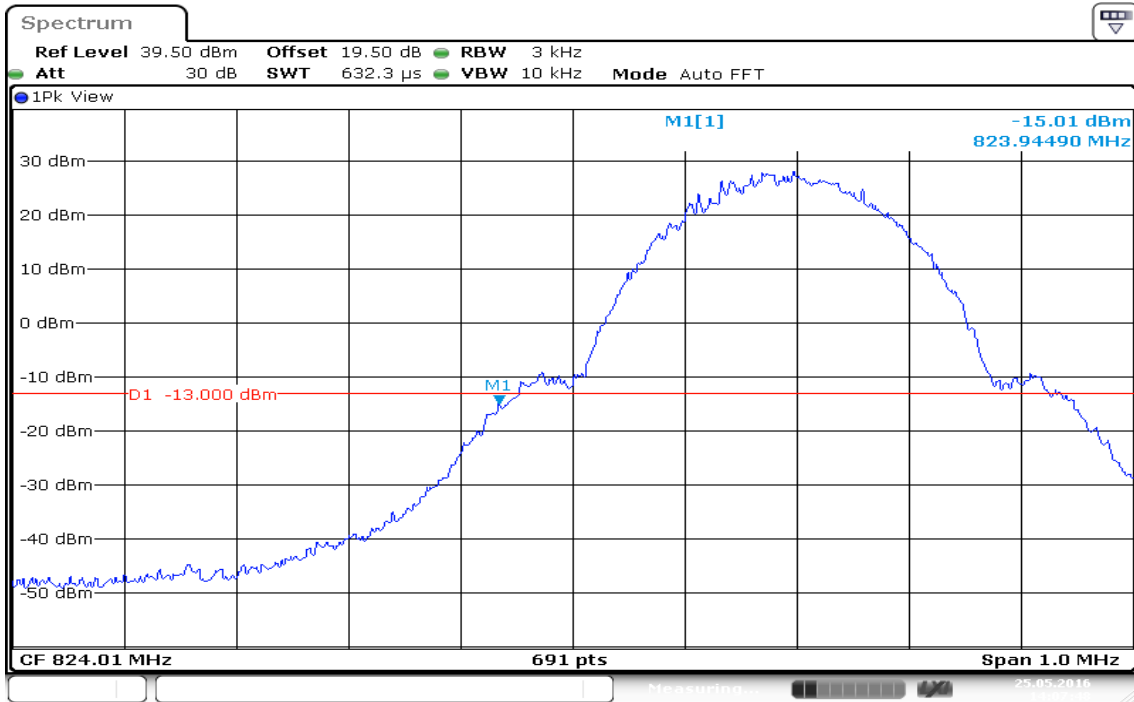
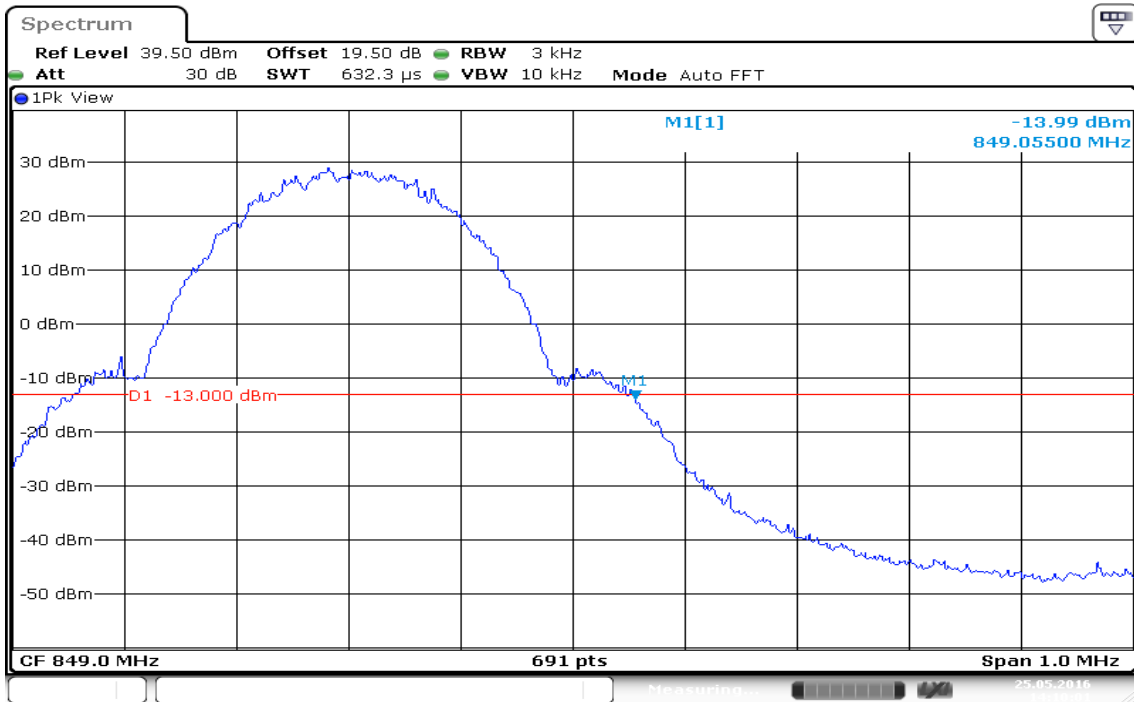


Figure 10-2: Band Edge emissions –GPRS CH High





## GPRS 1900

Figure 11-1: Band Edge emissions – GPRS CH Low

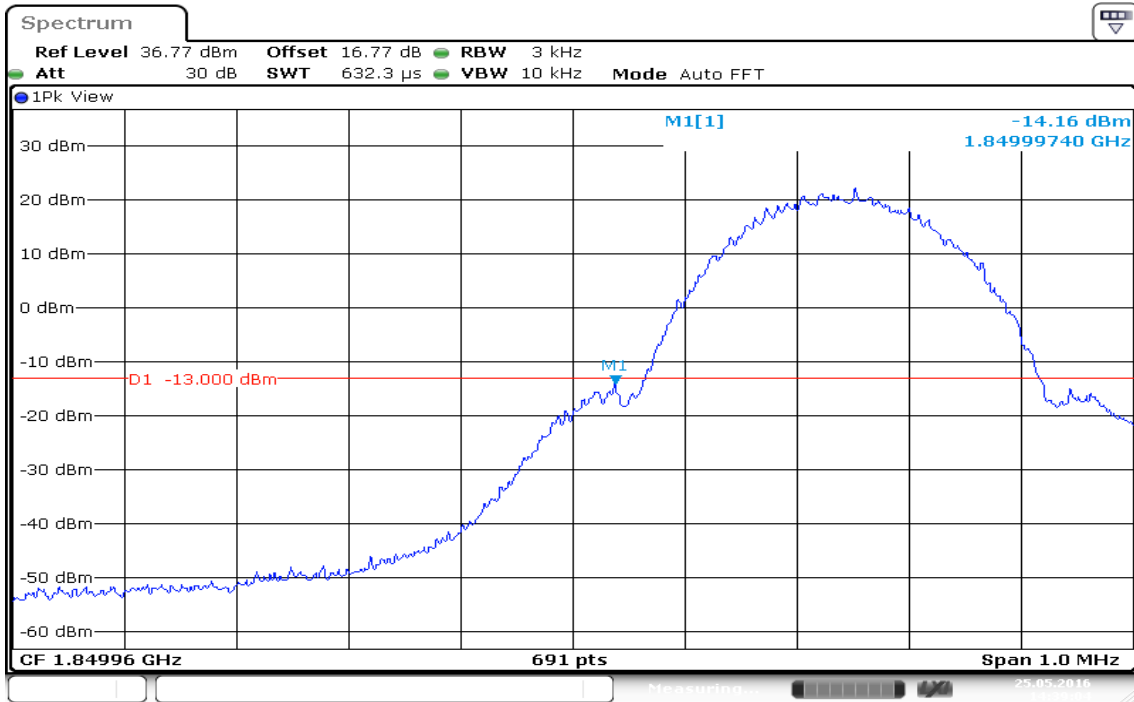
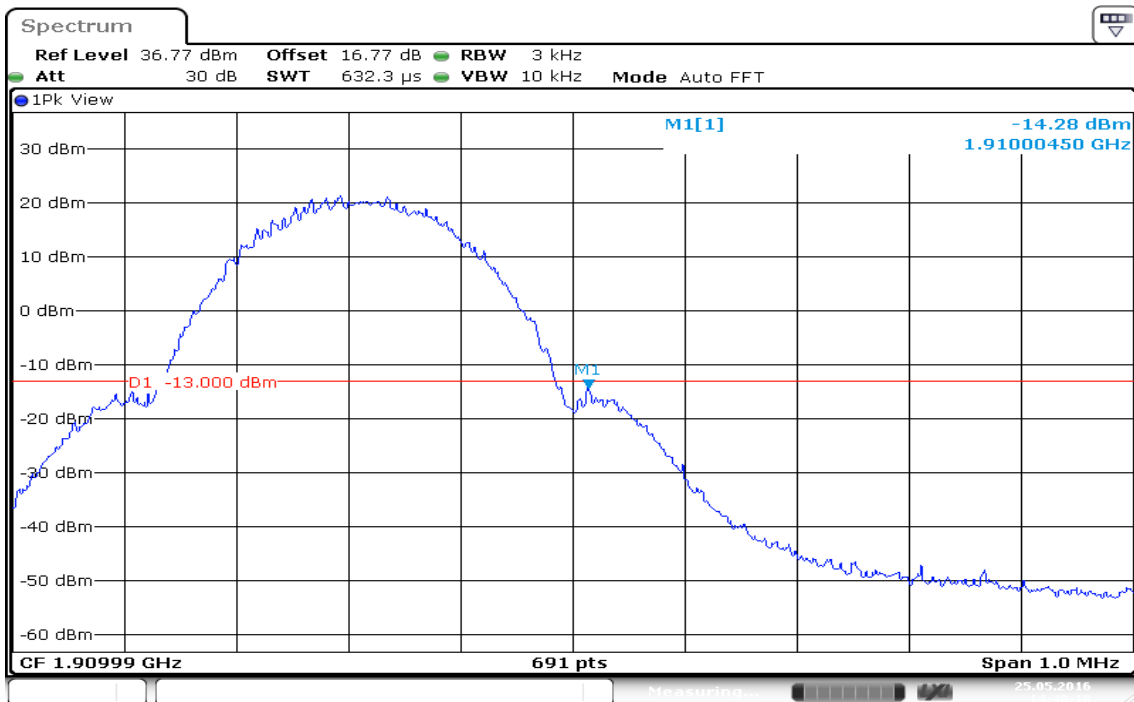
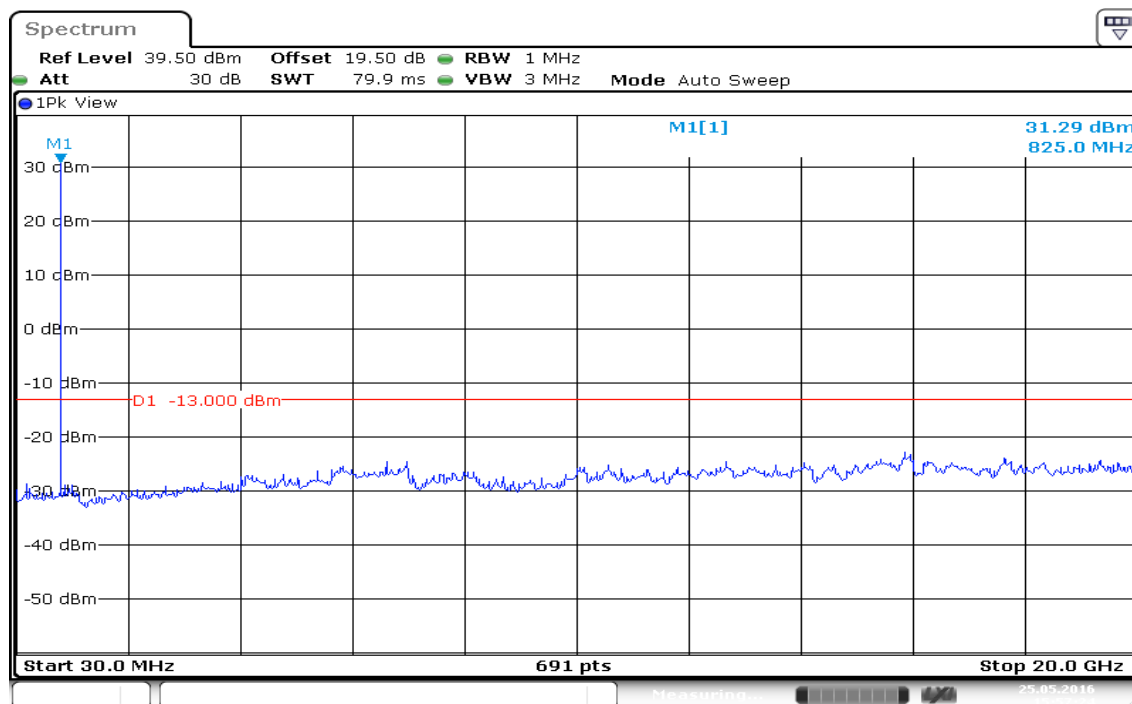


Figure 11-2: Band Edge emissions – GPRS CH High



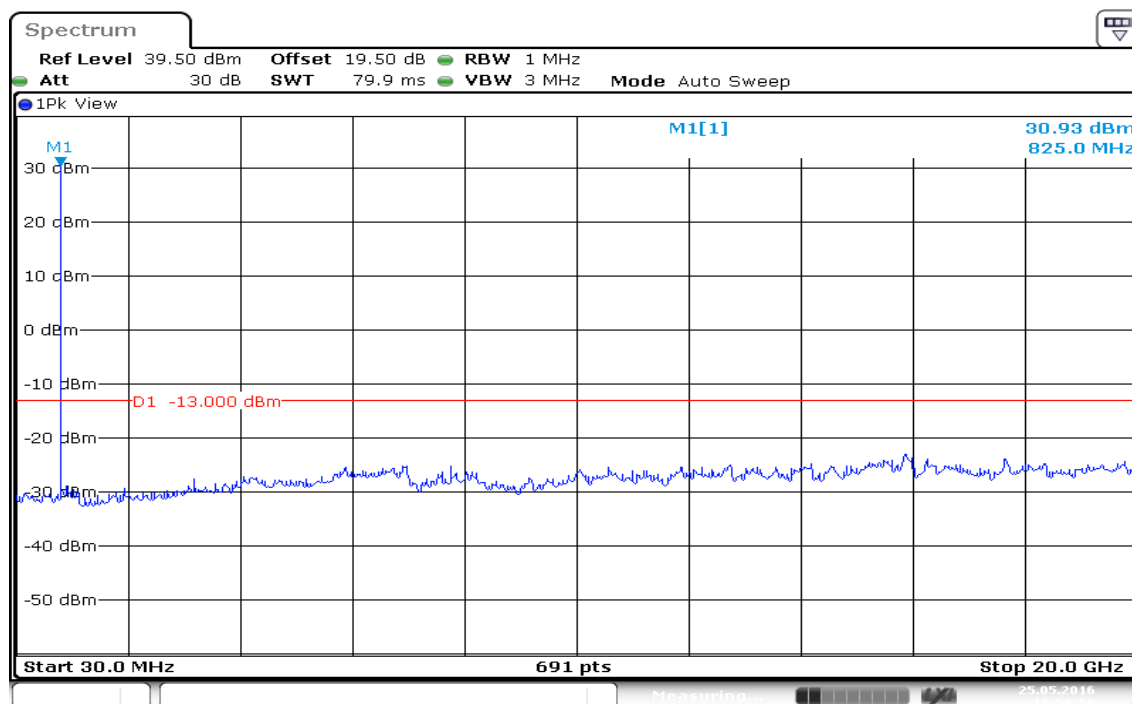
## EDGE 850

Figure 12-1: Out of Band emission at antenna terminals –EDGE CH Low



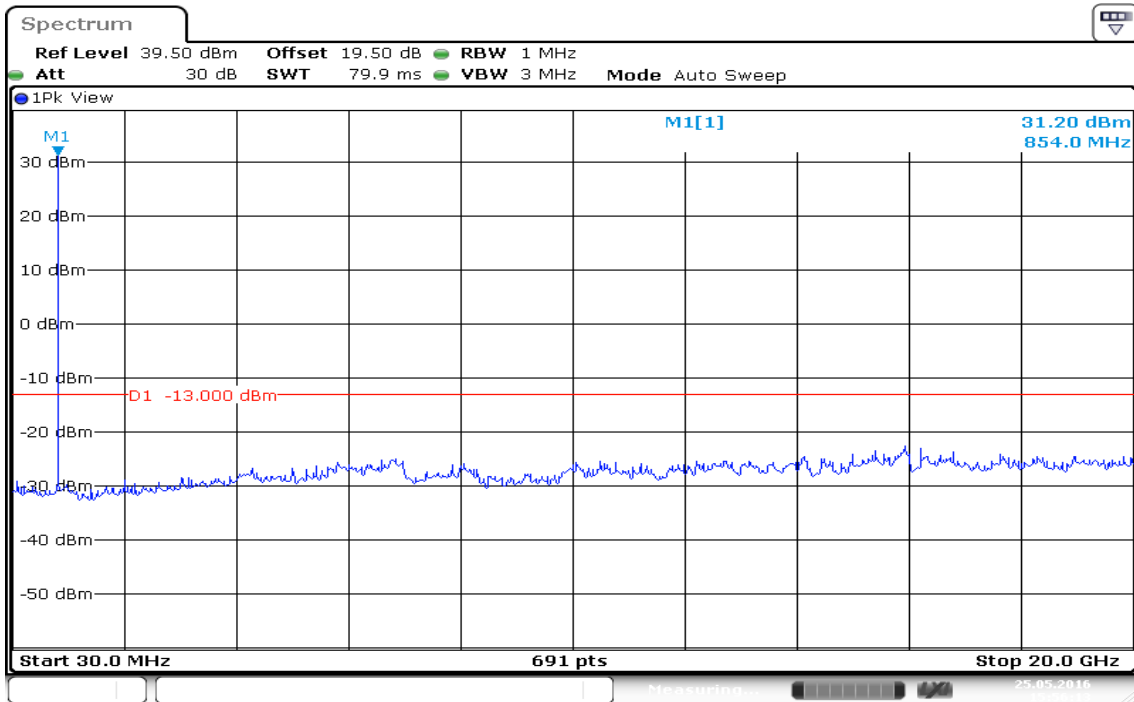
Date: 25 MAY 2016 15:57:24

Figure 12-2: Out of Band emission at antenna terminals –EDGE CH Mid



Date: 25 MAY 2016 15:56:50

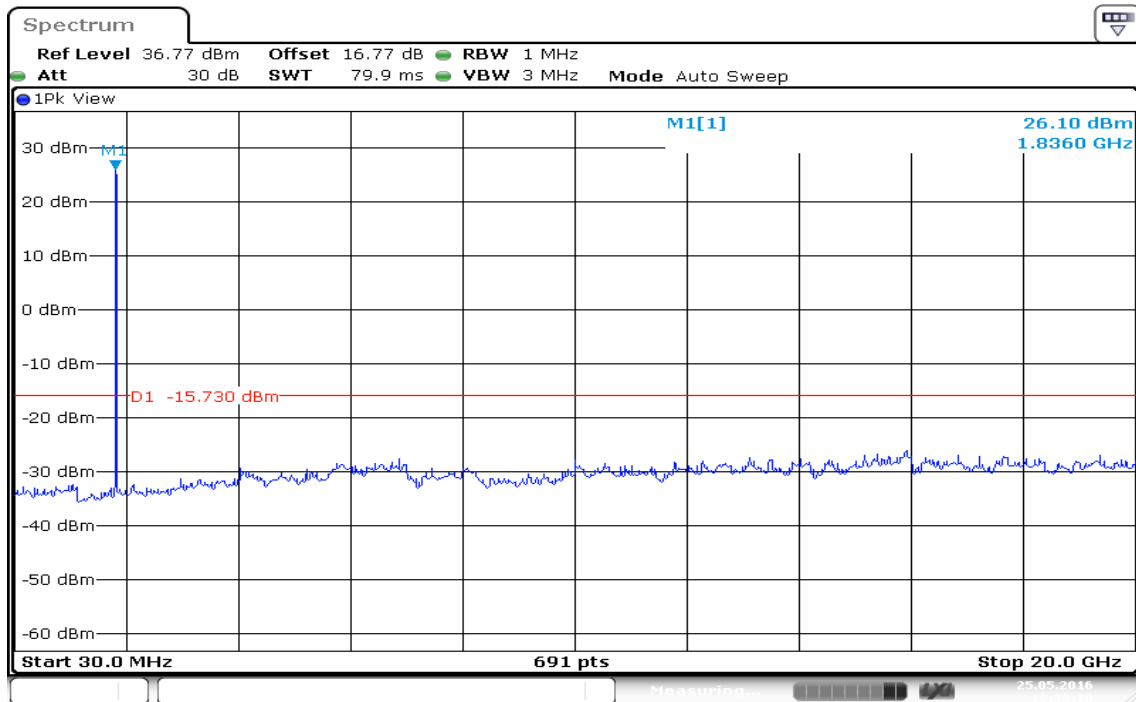
Figure 12-3: Out of Band emission at antenna terminals –EDGE CH High



Date: 25 MAY 2016 15:56:13

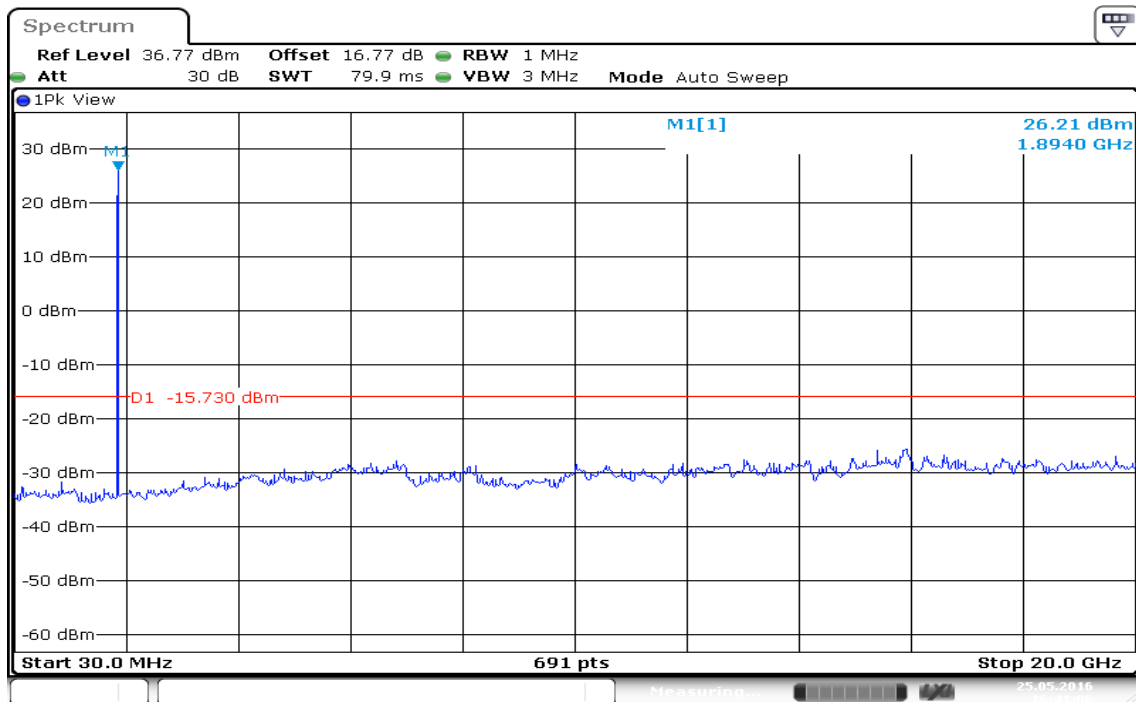
**EDGE 1900**

Figure 13-1: Out of Band emission at antenna terminals –EDGE CH Low



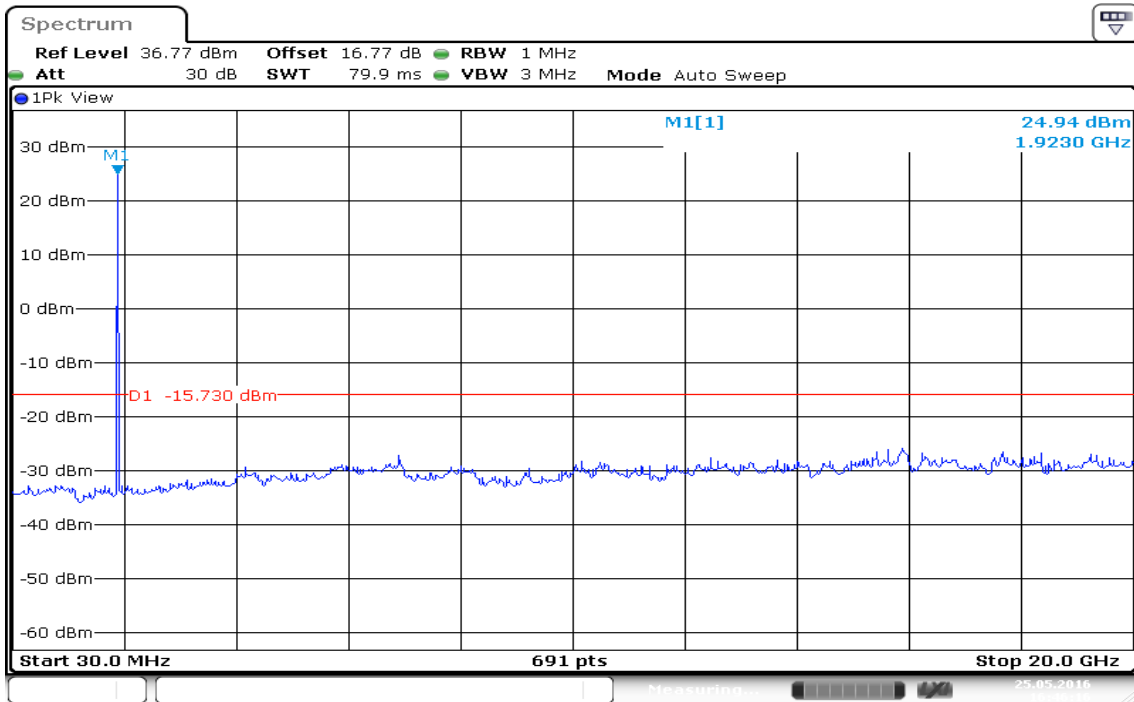
Date: 25 MAY 2016 16:36:10

Figure 13-2: Out of Band emission at antenna terminals –EDGE CH Mid



Date: 25 MAY 2016 16:41:07

Figure 13-3: Out of Band emission at antenna terminals –EDGE CH High



Date: 25 MAY 2016 16:46:16

**EDGE 850**

Figure 14-1: Band Edge emissions – EDGE CH Low

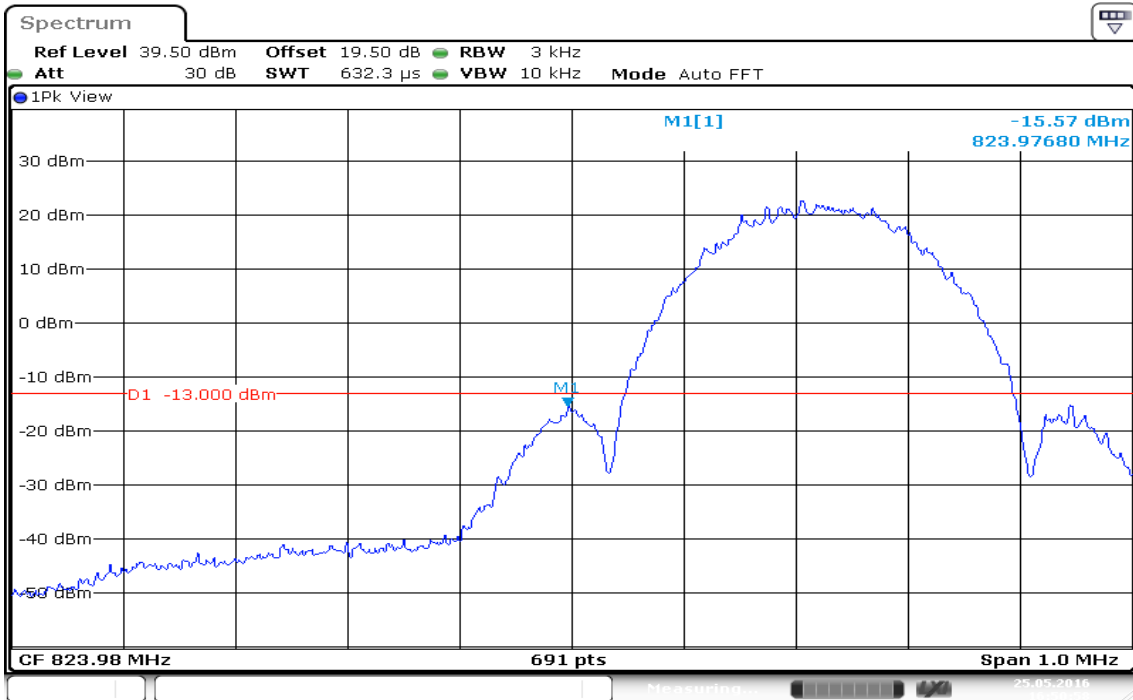
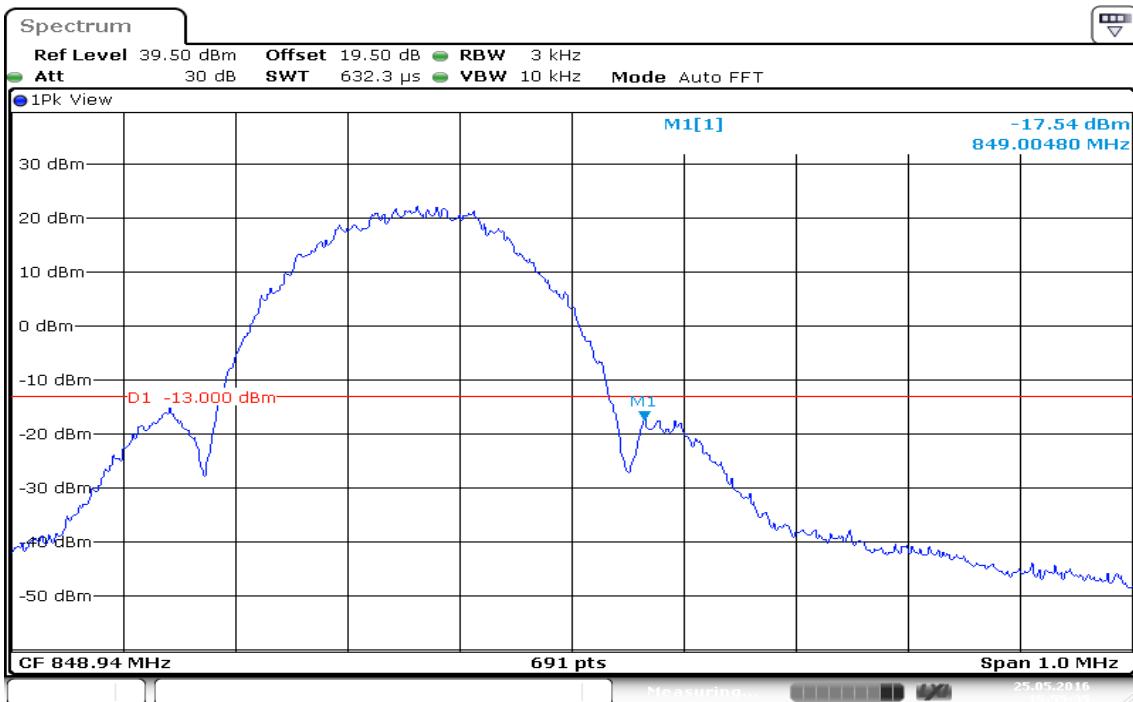


Figure 14-2: Band Edge emissions – EDGE CH High



**EDGE 1900**

Figure 15-1: Band Edge emissions – EDGE CH Low

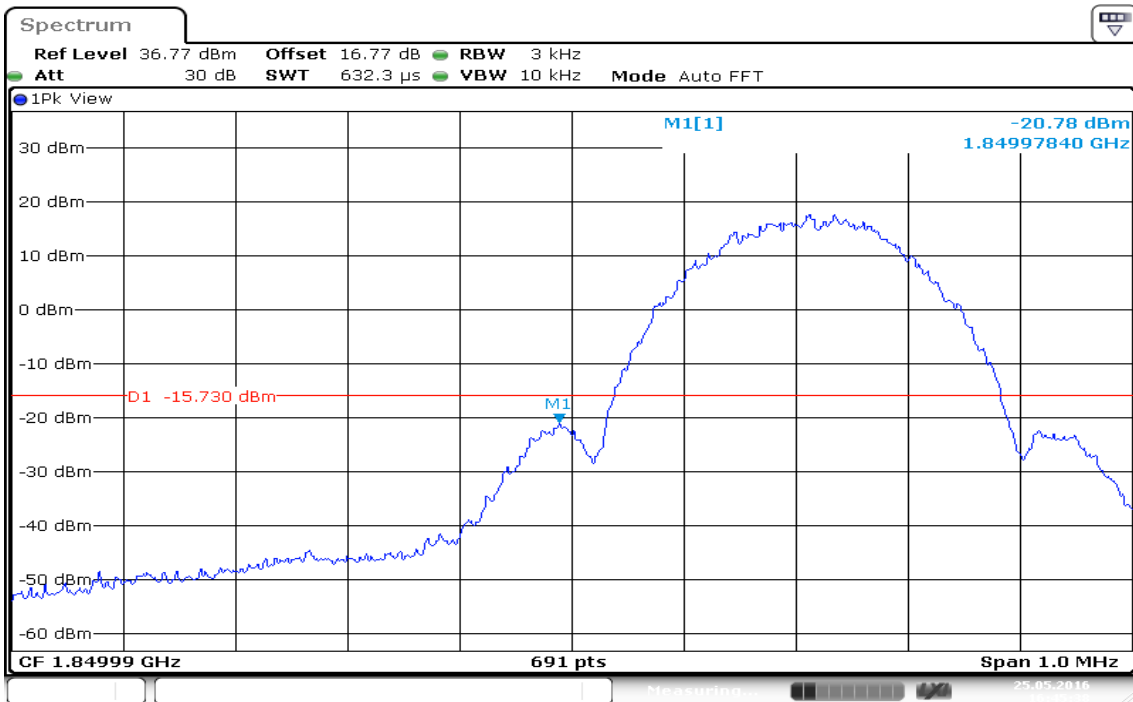
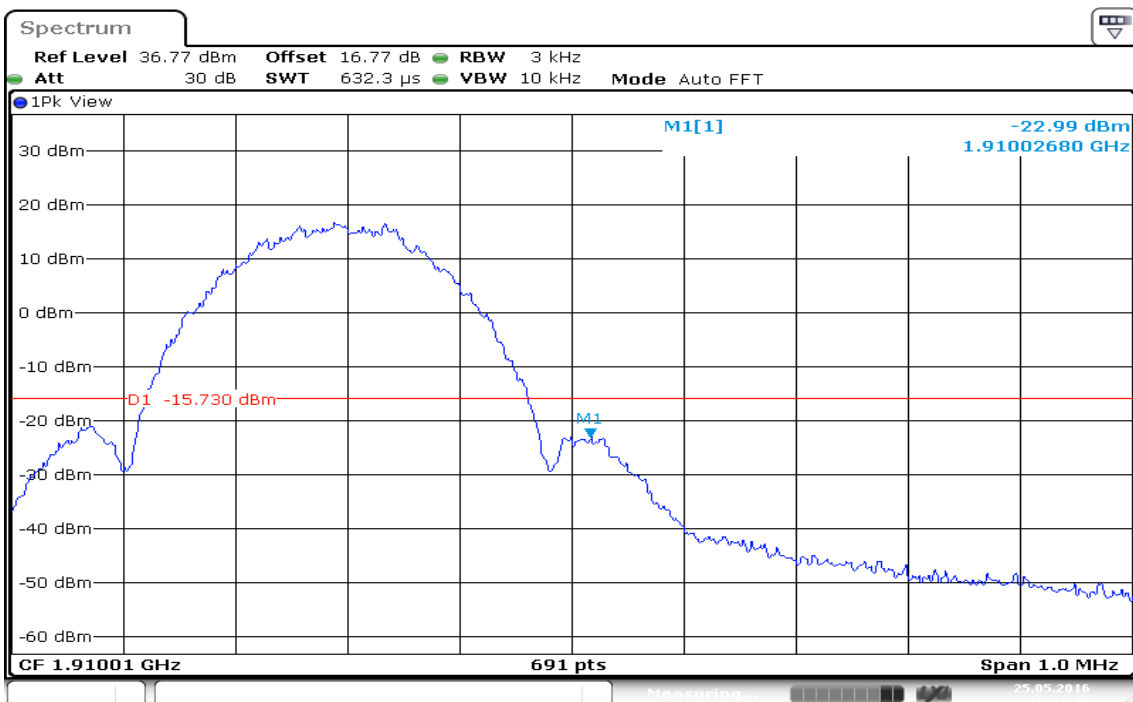


Figure 15-2: Band Edge emissions – EDGE CH High



## WCDMA Band II

Figure 16-1: Out of Band emission at antenna terminals – WCDMA CH Low

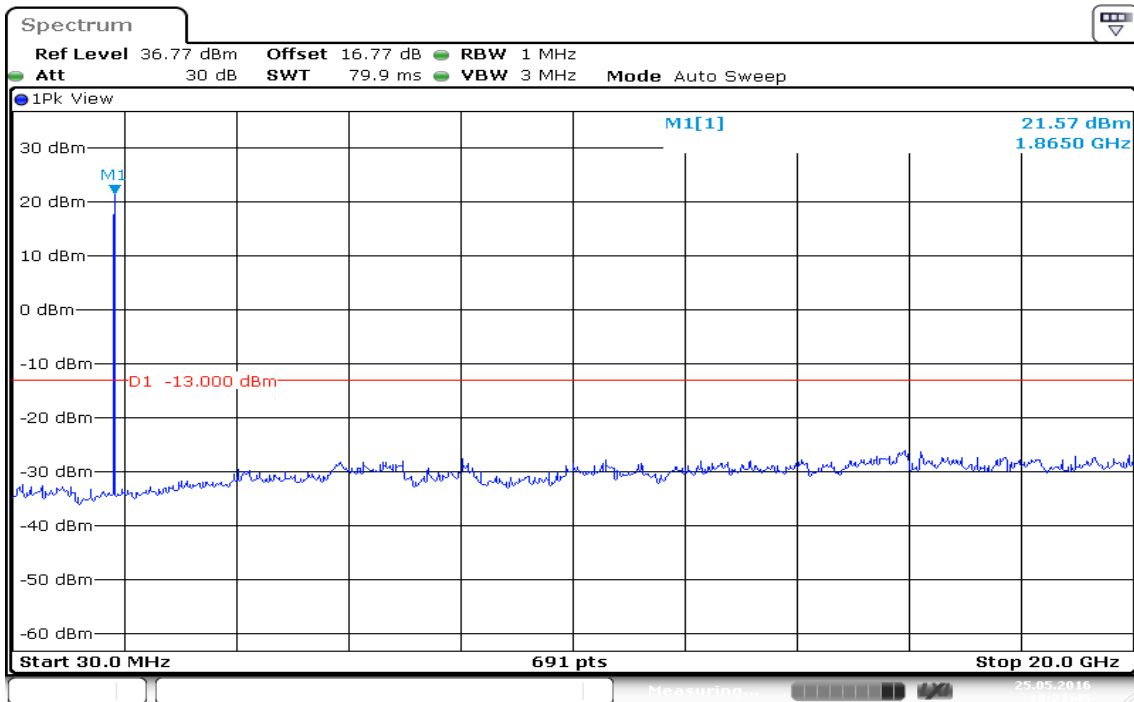


Figure 16-2: Out of Band emission at antenna terminals – WCDMA CH Mid

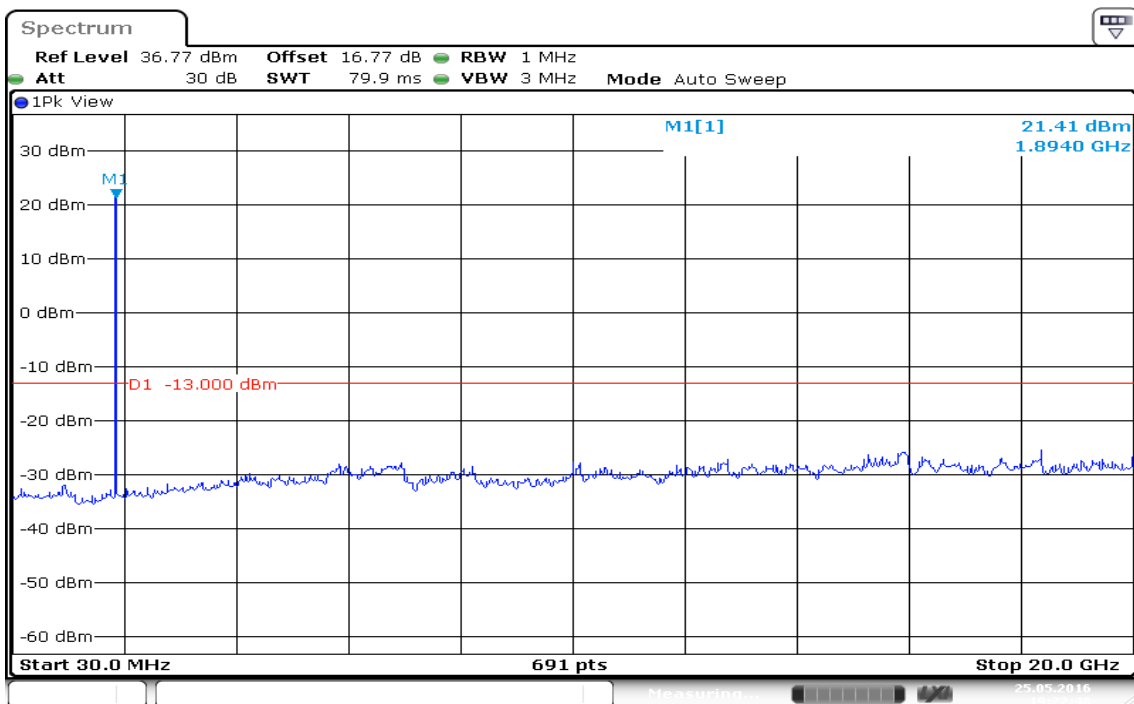
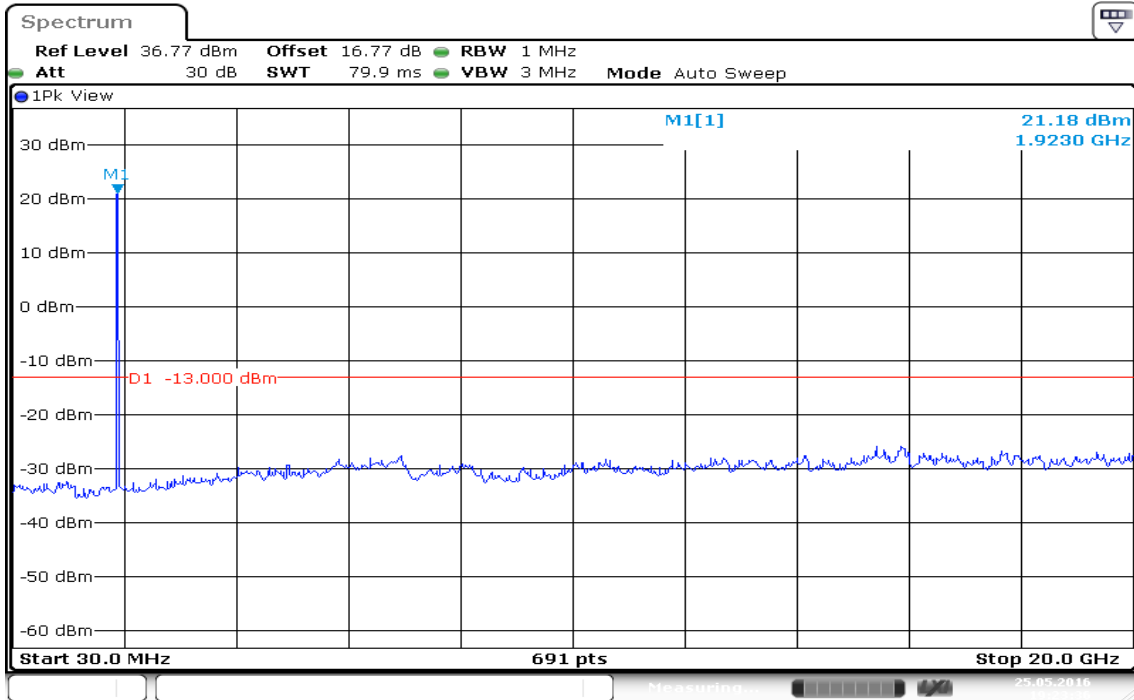




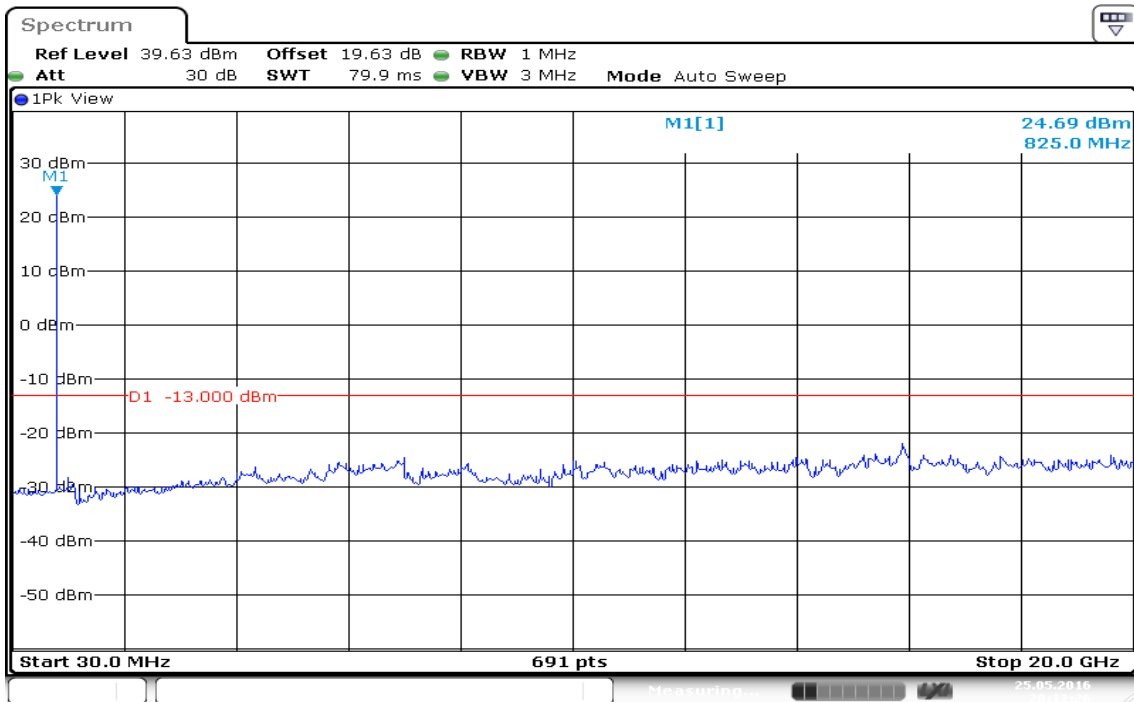
Figure 16-3: Out of Band emission at antenna terminals – WCDMA CH High



Date: 25 MAY 2016 19:23:36

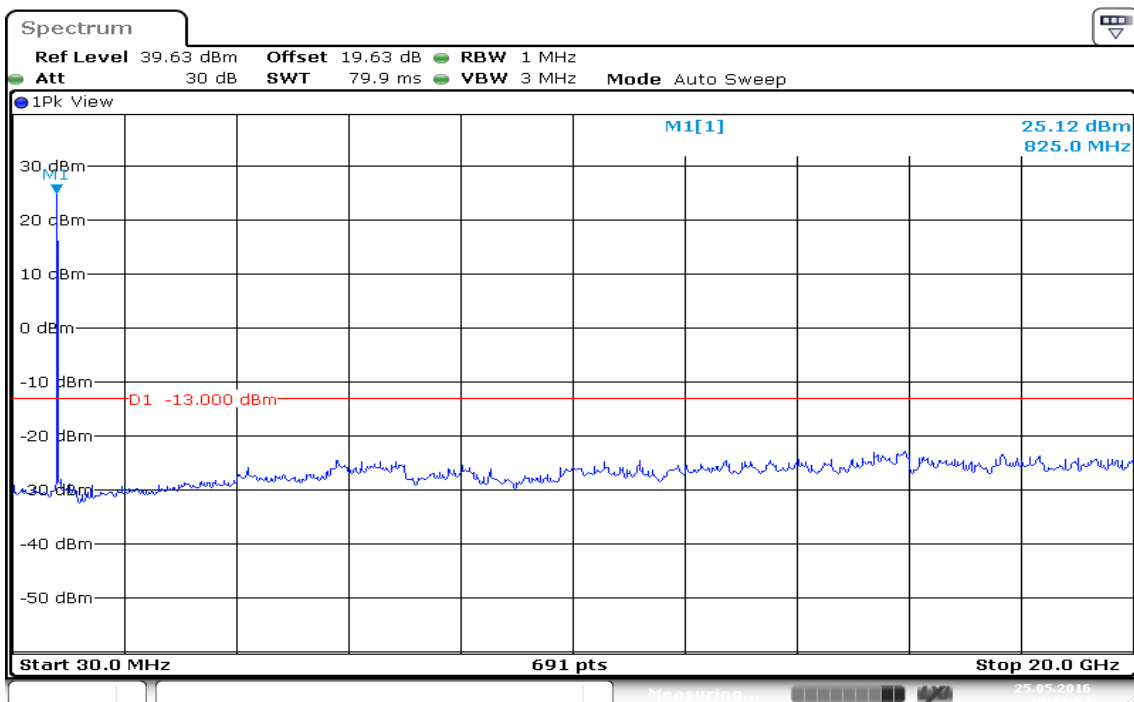
## WCDMA Band V

Figure 17-1: Out of Band emission at antenna terminals – WCDMA CH Low



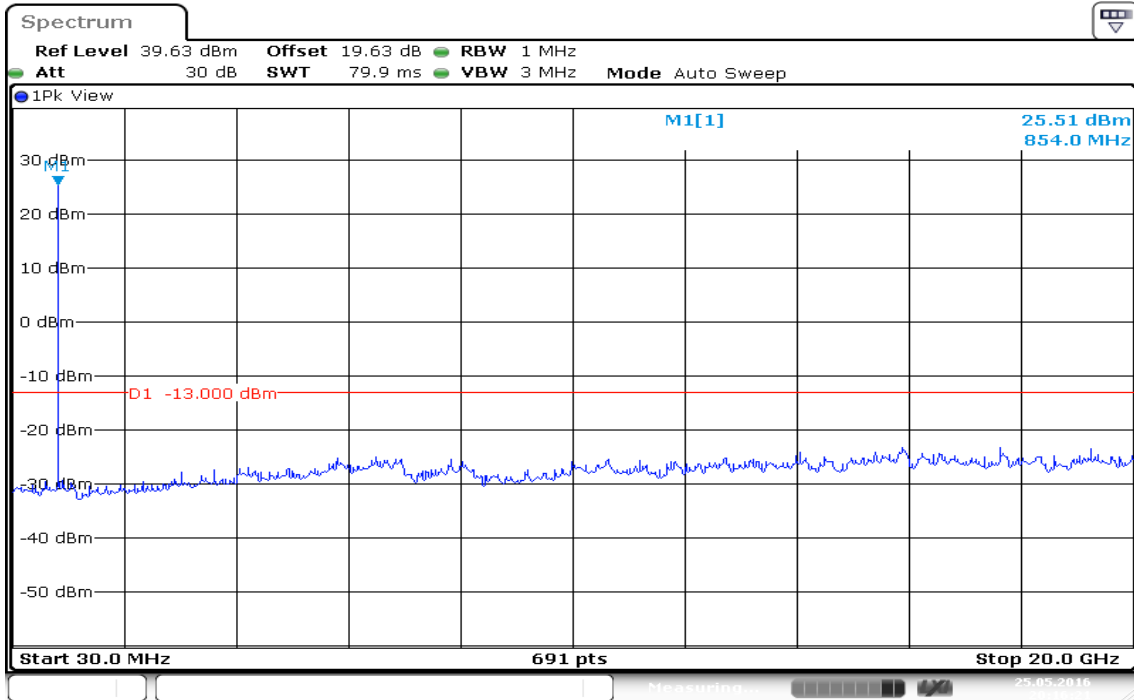
Date: 25 MAY 2016 20:11:26

Figure 17-2: Out of Band emission at antenna terminals – WCDMA CH Mid



Date: 25 MAY 2016 20:12:56

Figure 17-3: Out of Band emission at antenna terminals – WCDMA CH High



Date: 25 MAY 2016 20:16:21

## WCDMA Band II

Figure 18-1: Band Edge emissions – WCDMA CH Low

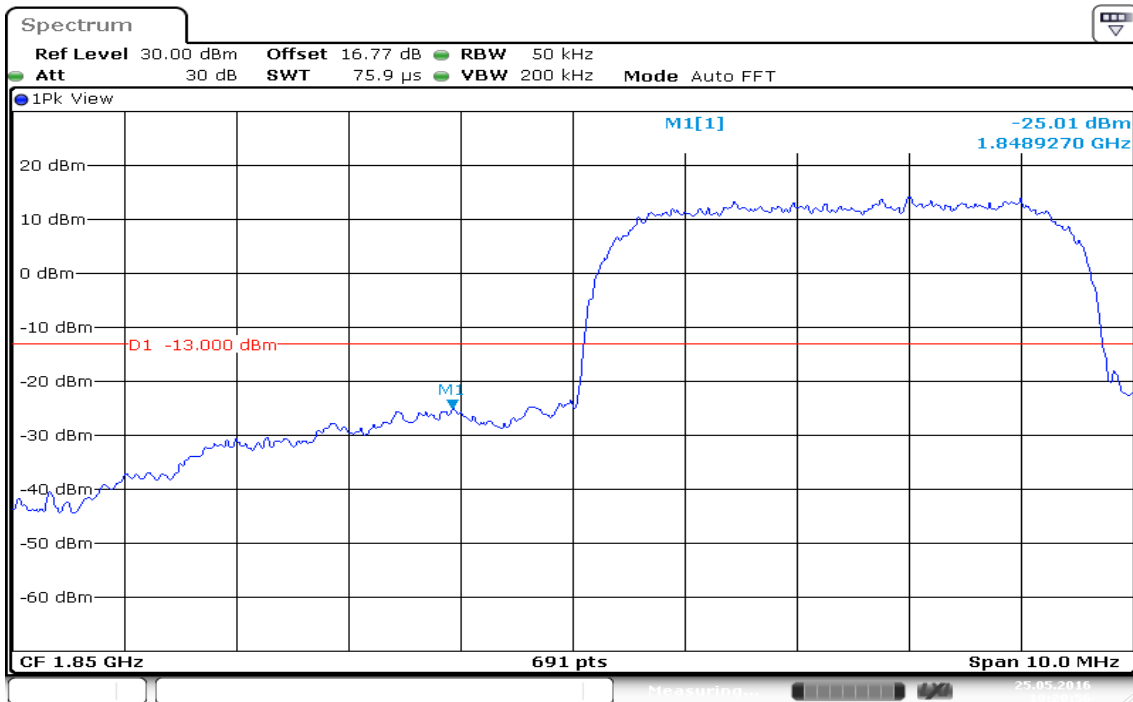
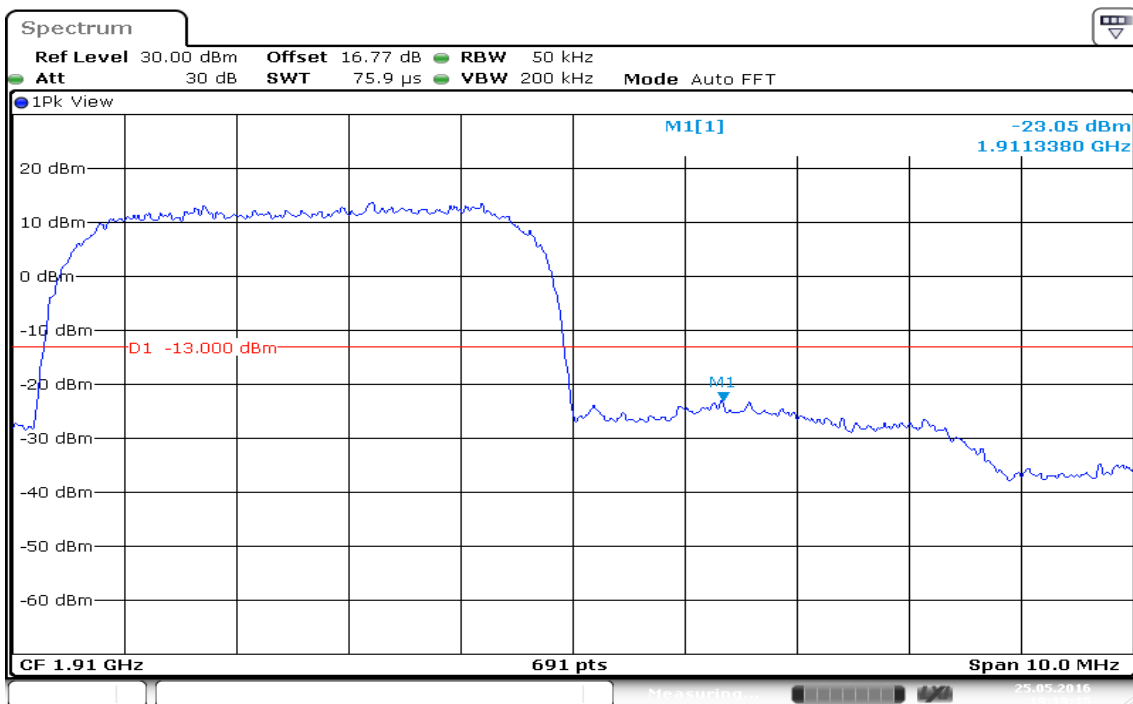


Figure 18-2: Band Edge emissions –WCDMA CH High



## WCDMA Band V

Figure 19-1: Band Edge emissions –WCDMA CH Low

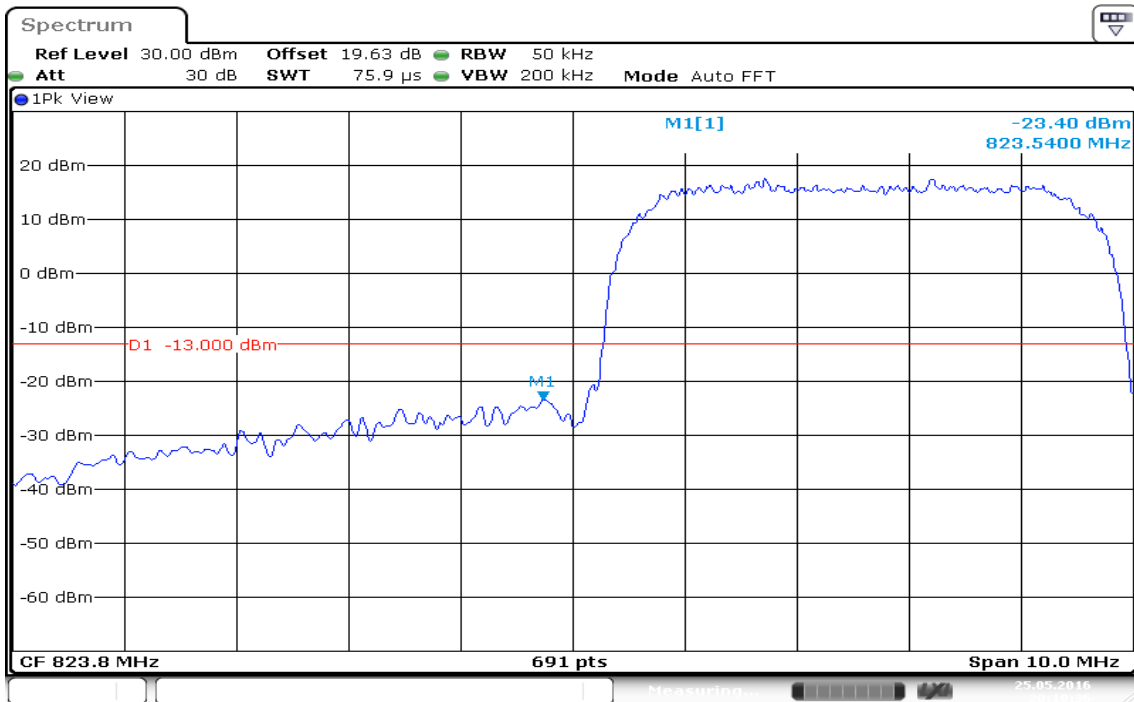
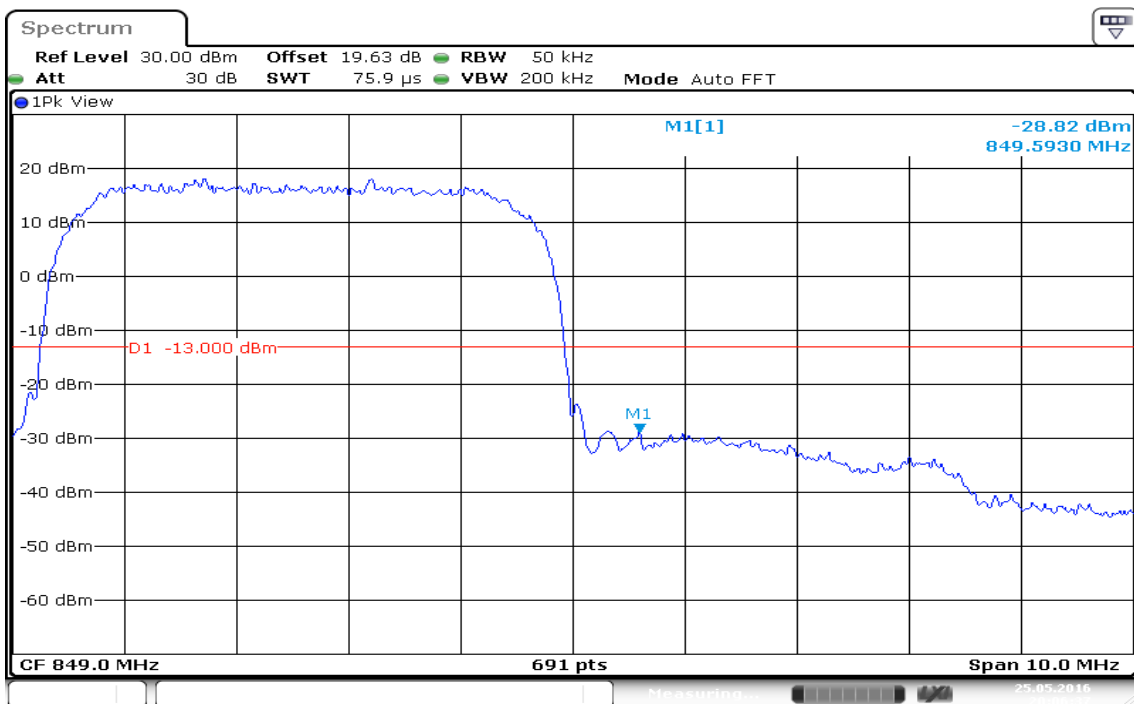


Figure 19-2: Band Edge emissions –WCDMA CH High



## HSDPA Band II

Figure 20-1: Out of Band emission at antenna terminals – HSDPA CH Low

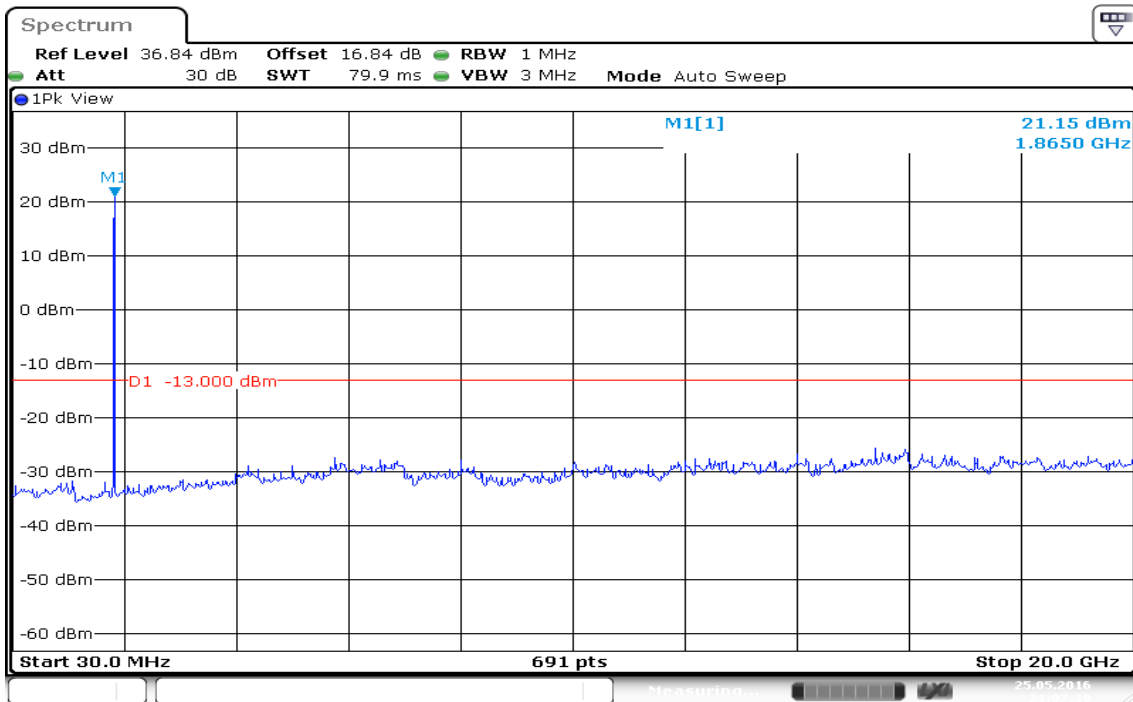


Figure 20-2: Out of Band emission at antenna terminals – HSDPA CH Mid

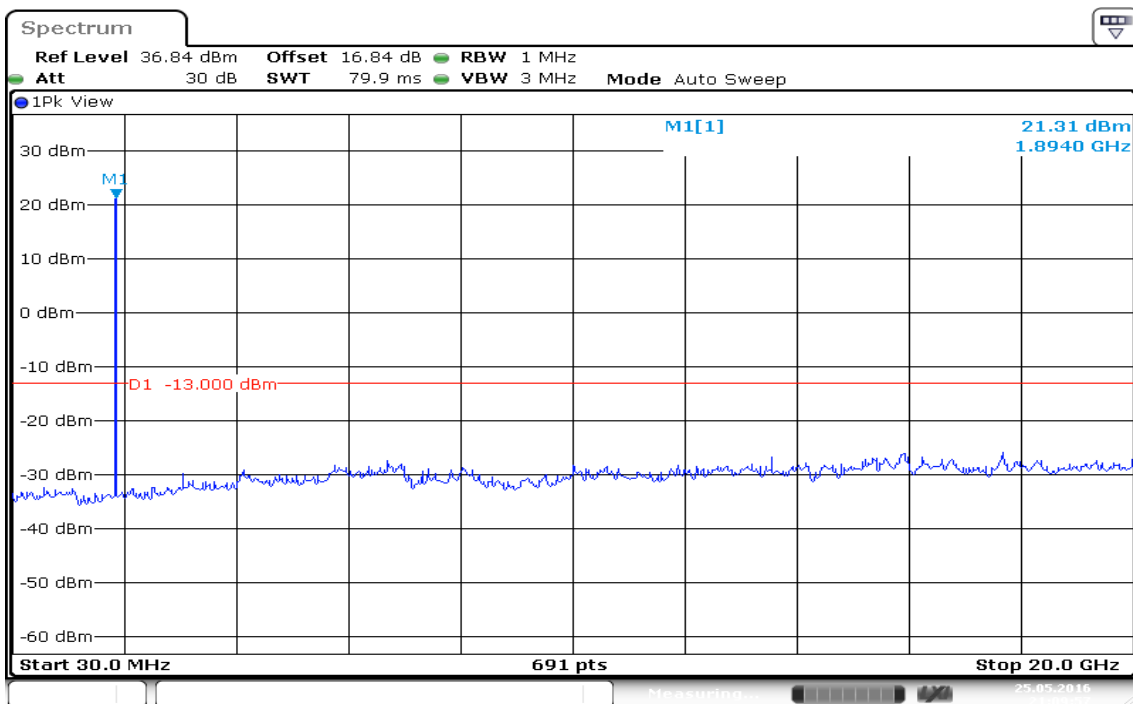
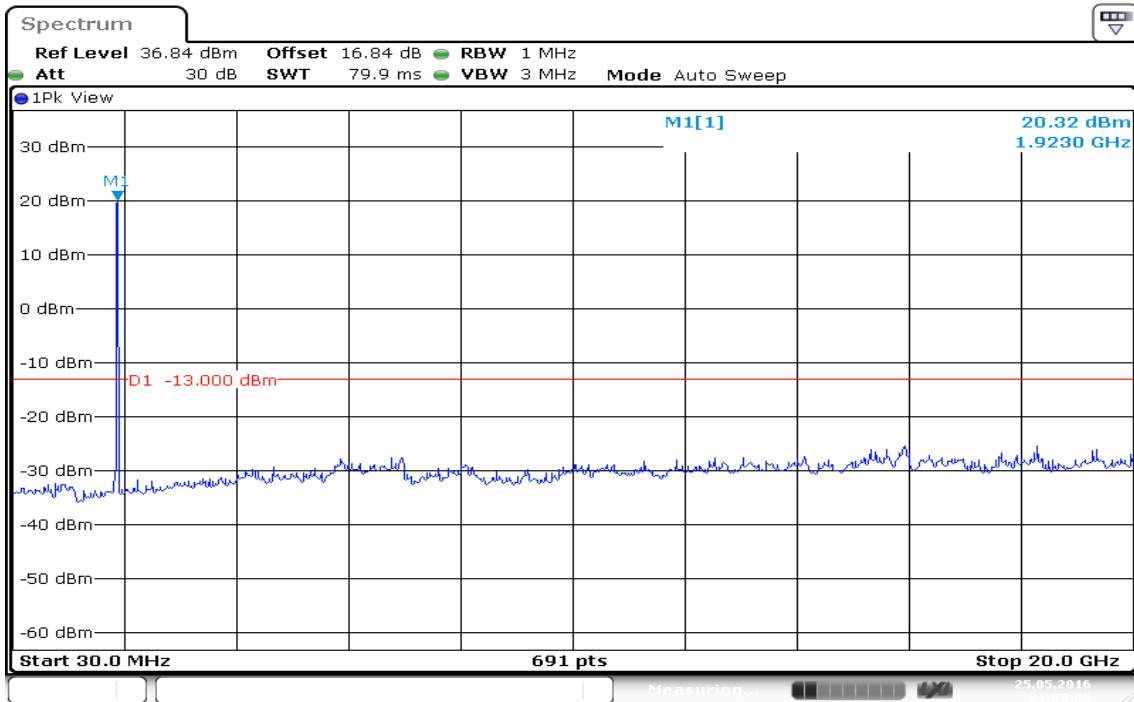


Figure 20-3: Out of Band emission at antenna terminals – HSDPA CH High



Date: 25 MAY 2016 21:09:05

## HSDPA Band V

Figure 21-1: Out of Band emission at antenna terminals – HSDPA CH Low

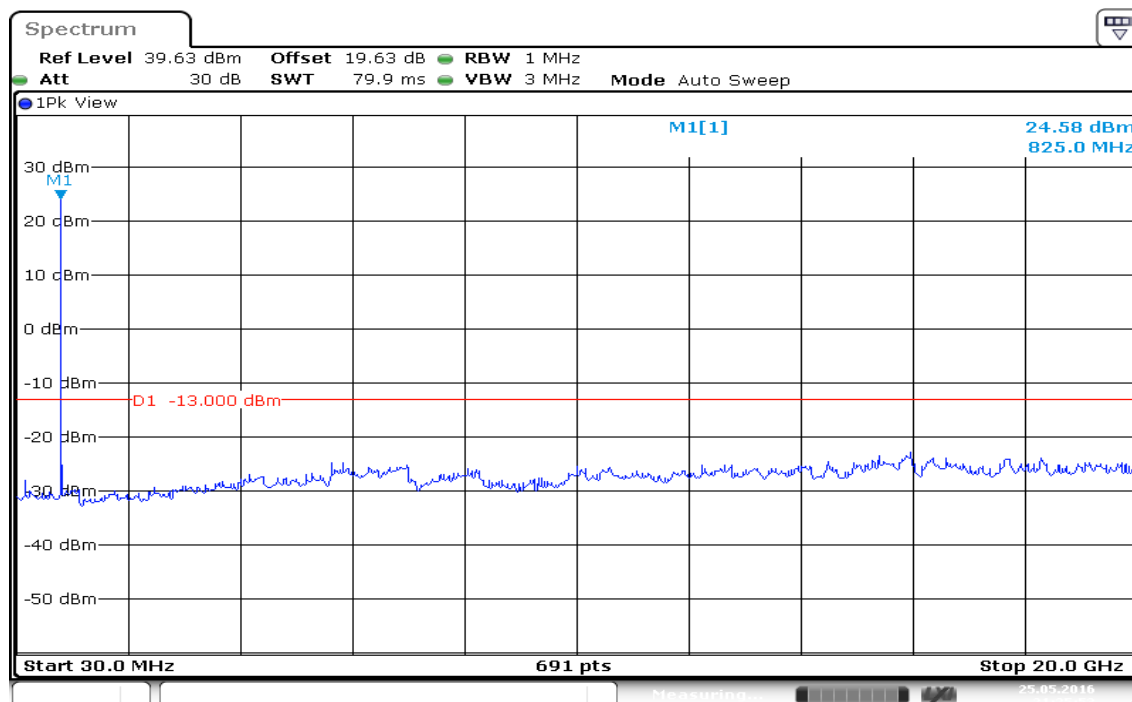


Figure 21-2: Out of Band emission at antenna terminals – HSDPA CH Mid

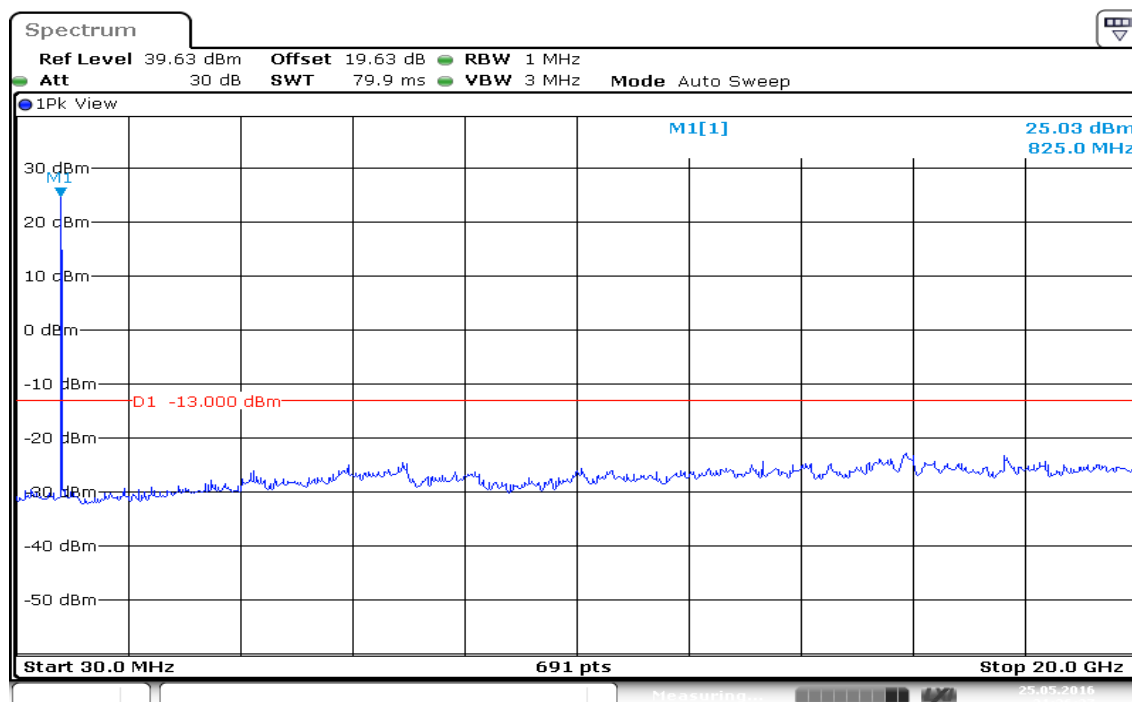
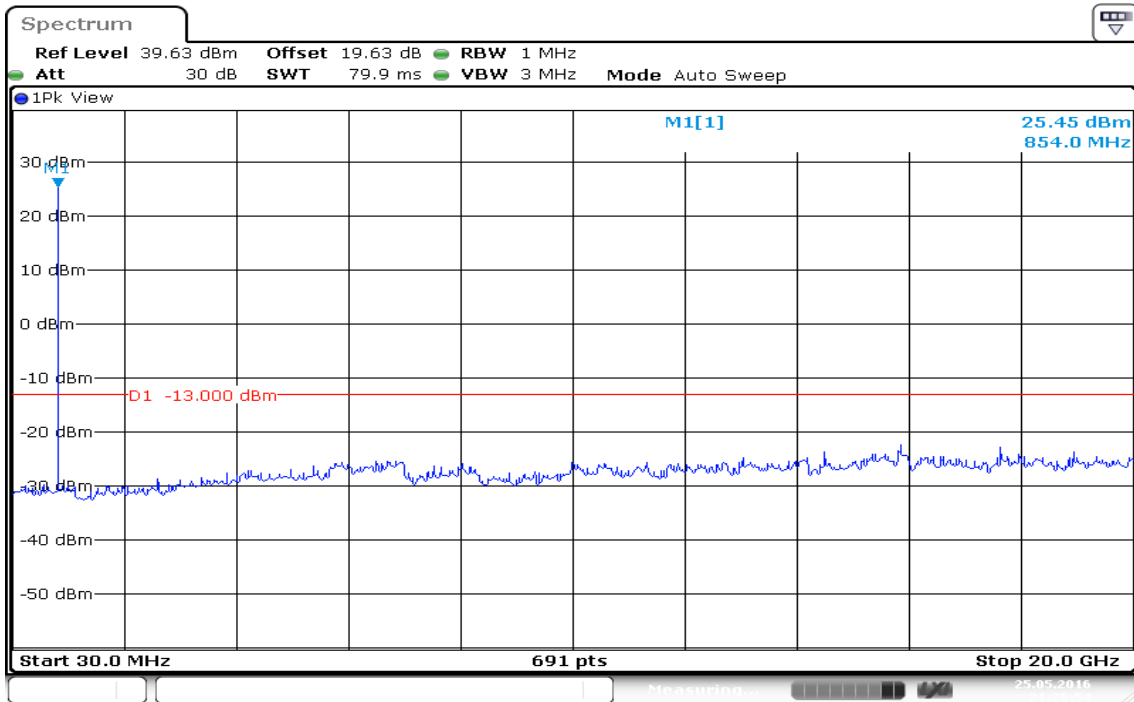




Figure 21-3: Out of Band emission at antenna terminals – HSDPA CH High



Date: 25 MAY 2016 21:26:54

## HSDPA Band II

Figure 22-1: Band Edge emissions – HSDPA CH Low

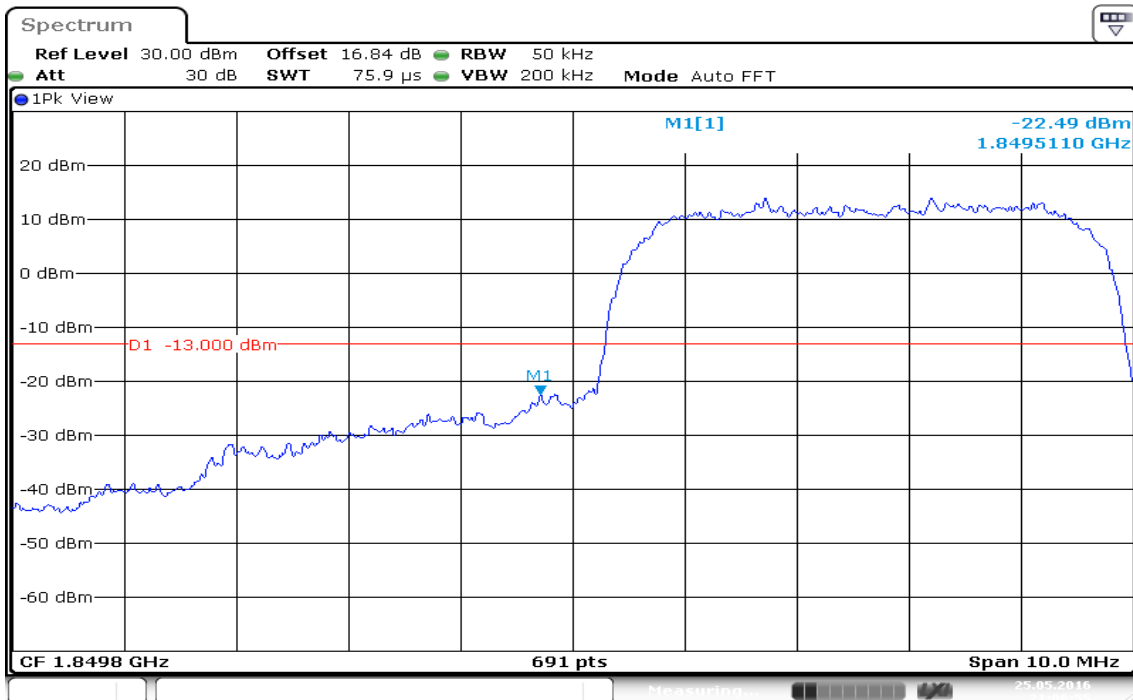
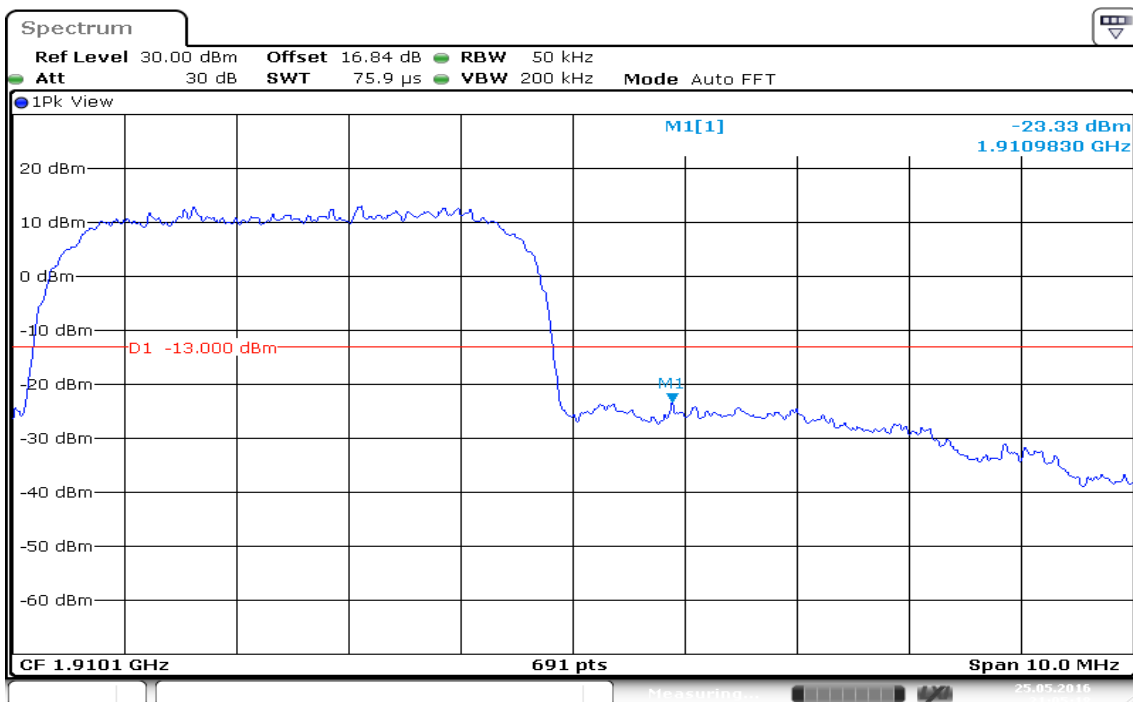
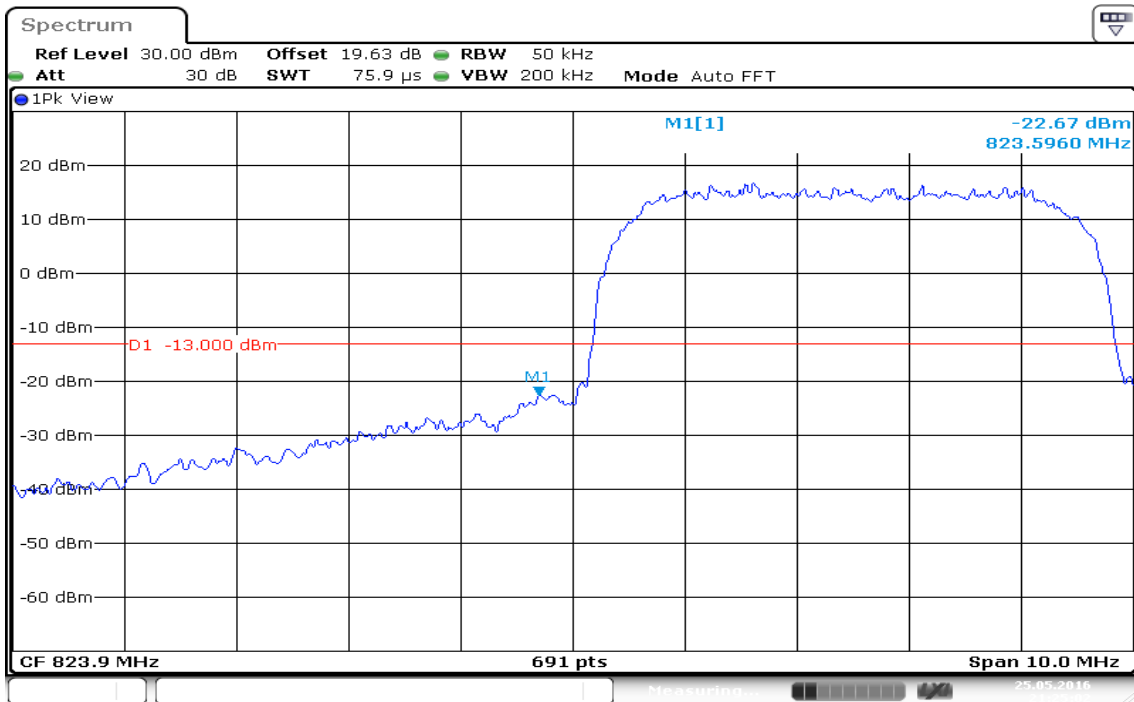


Figure 22-2: Band Edge emissions – HSDPA CH High



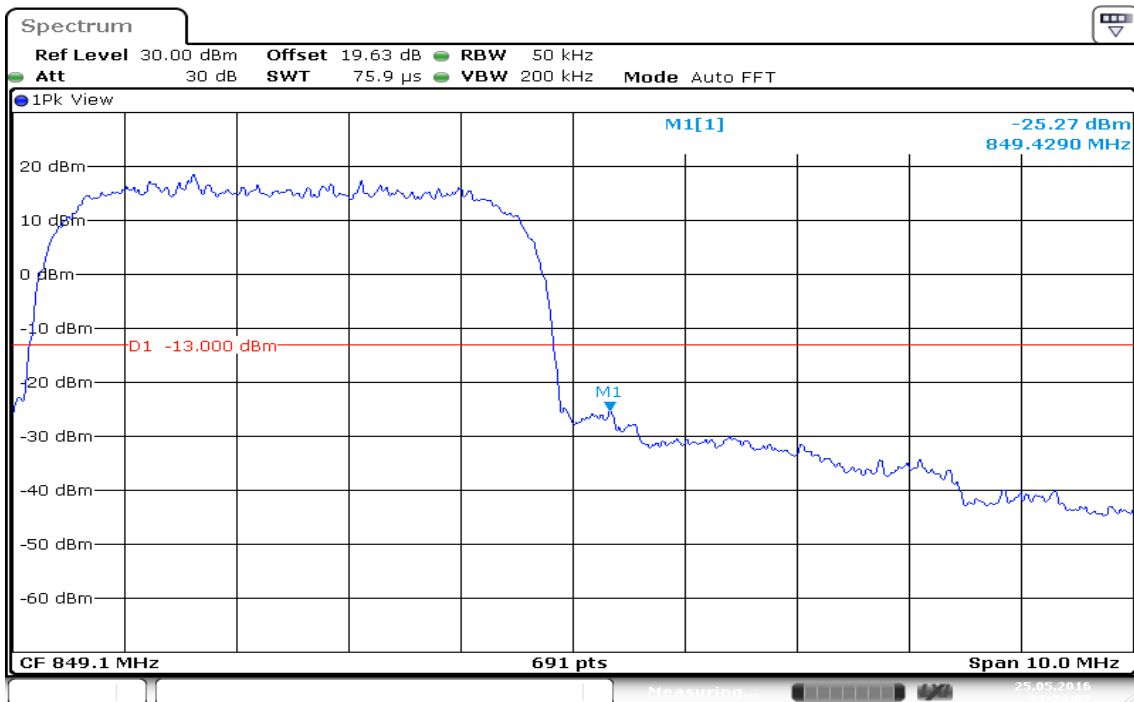
## HSDPA Band V

Figure 23-1: Band Edge emissions – HSDPA CH Low



Date: 25 MAY 2016 21:25:03

Figure 23-2: Band Edge emissions – HSDPA CH High



Date: 25 MAY 2016 21:24:07

## HSUPA Band II

Figure 24-1: Out of Band emission at antenna terminals – HSUPA CH Low

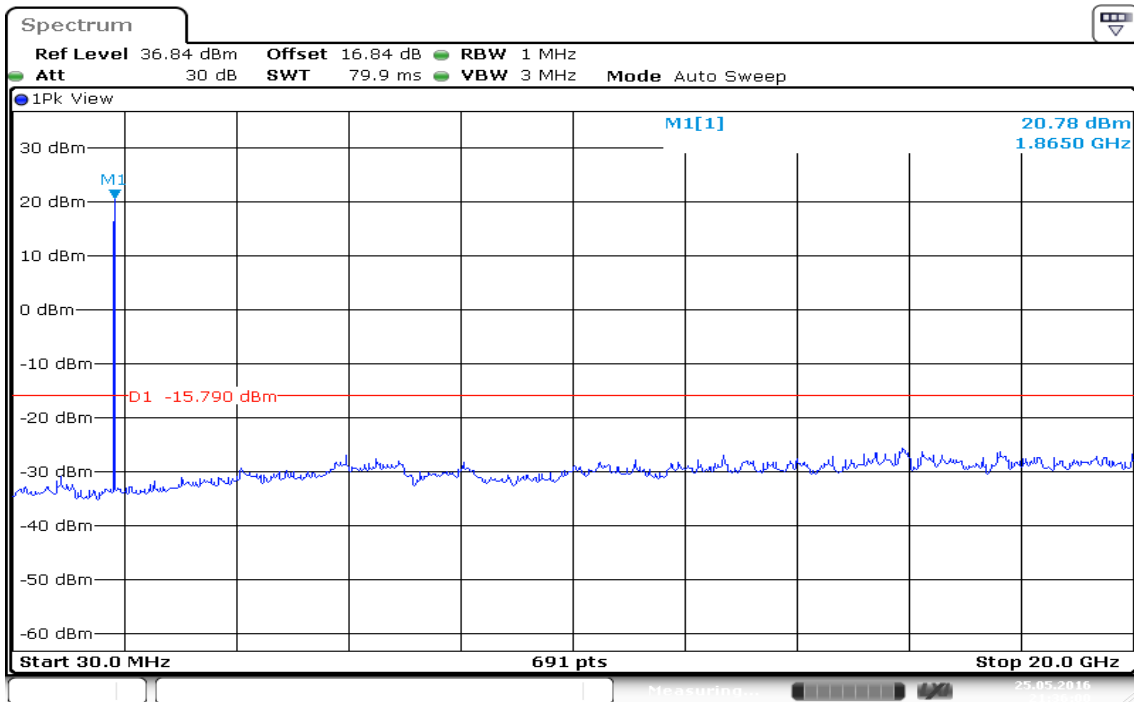


Figure 24-2: Out of Band emission at antenna terminals – HSUPA CH Mid

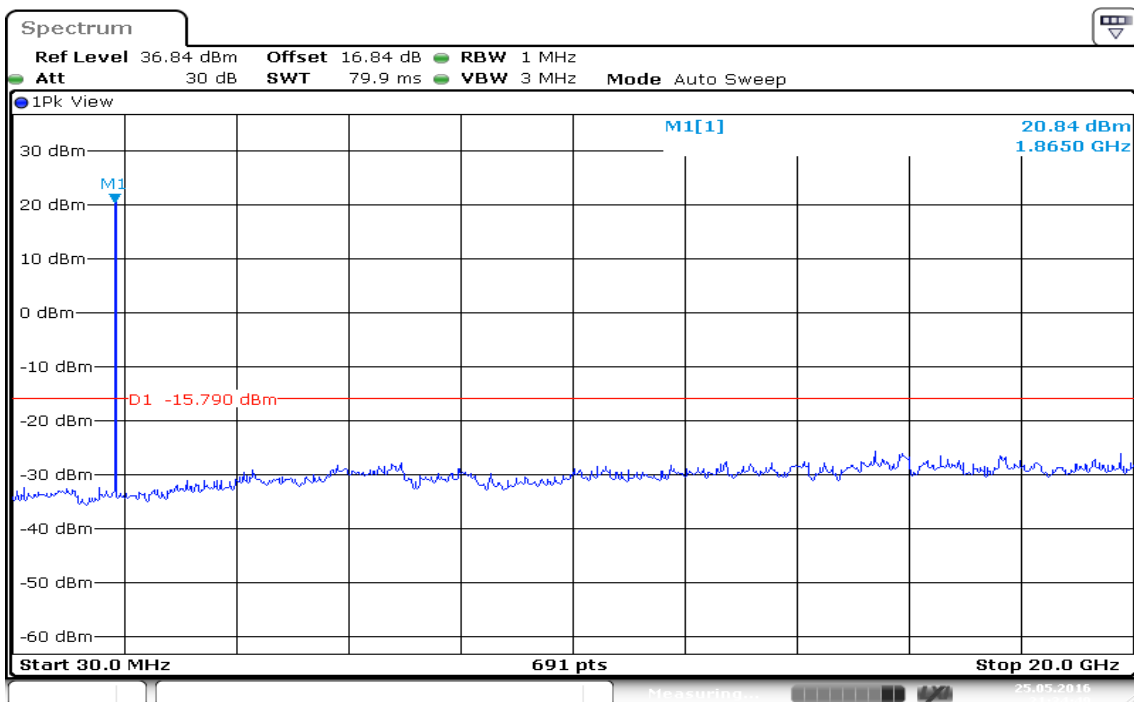
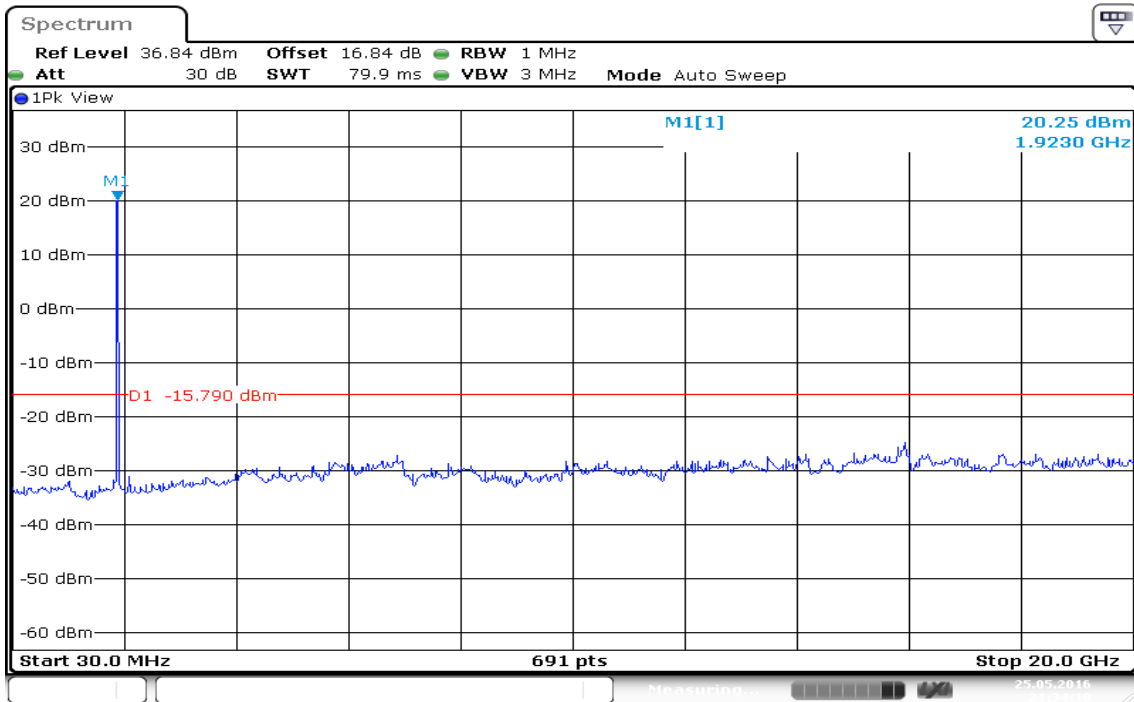


Figure 24-3: Out of Band emission at antenna terminals – HSUPA CH High



Date: 25 MAY 2016 21:34:10

## HSUPA Band V

Figure 25-1: Out of Band emission at antenna terminals – HSUPA CH Low

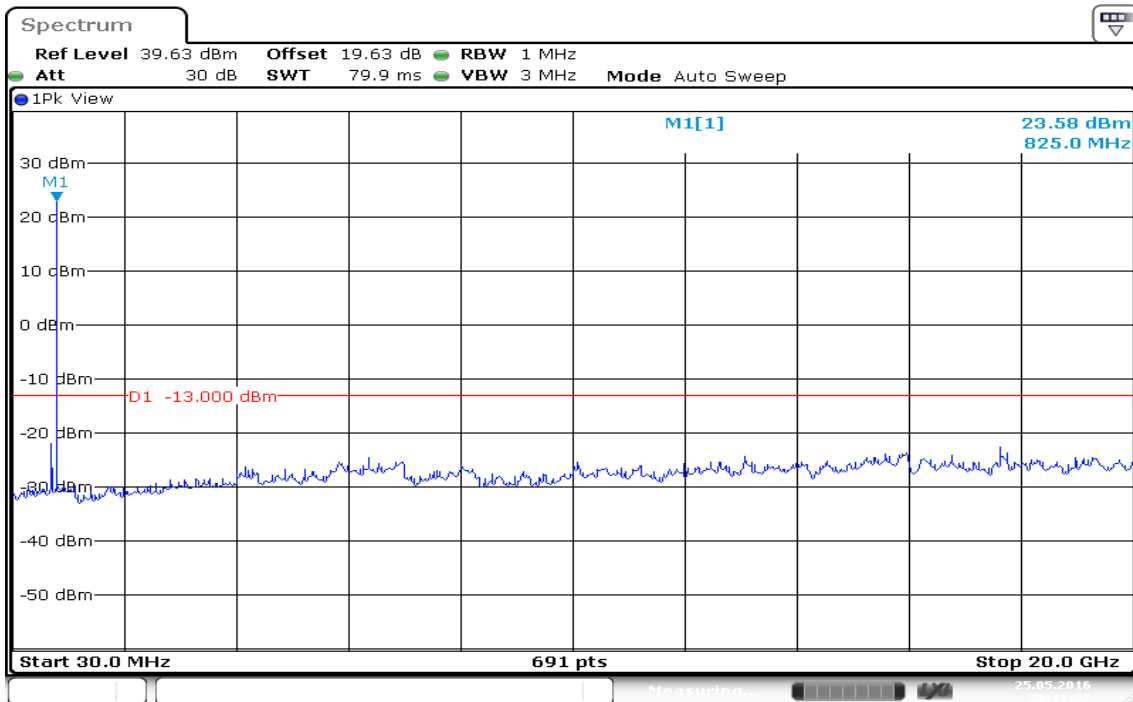


Figure 25-2: Out of Band emission at antenna terminals – HSUPA CH Mid

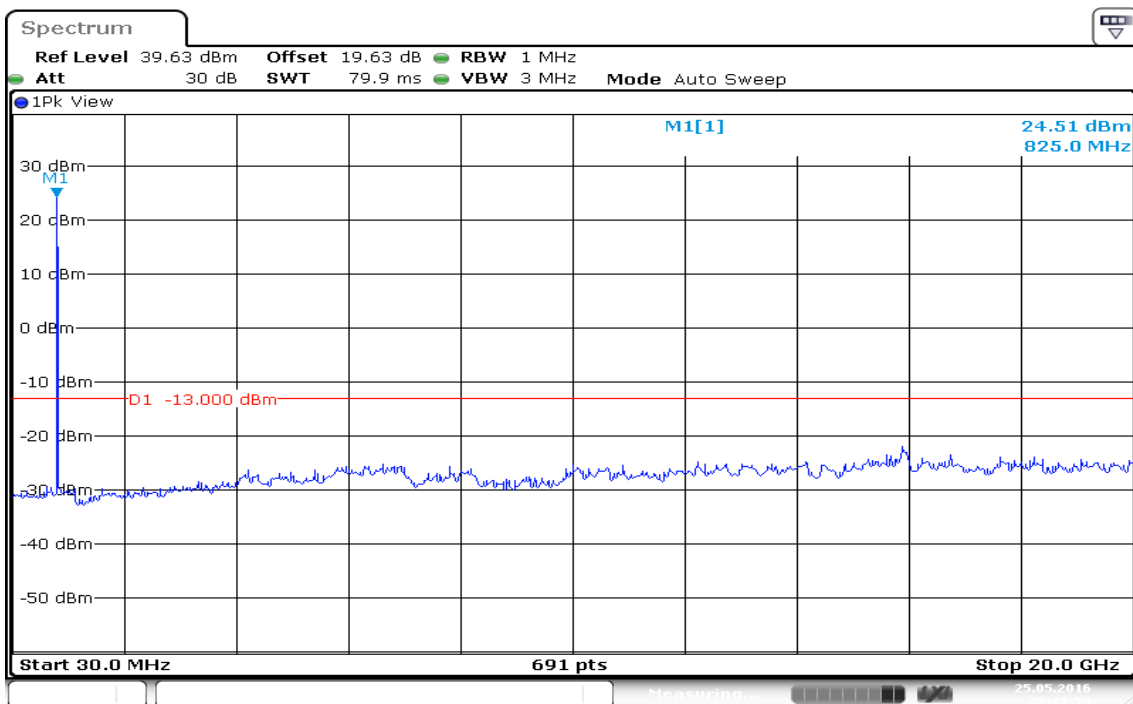
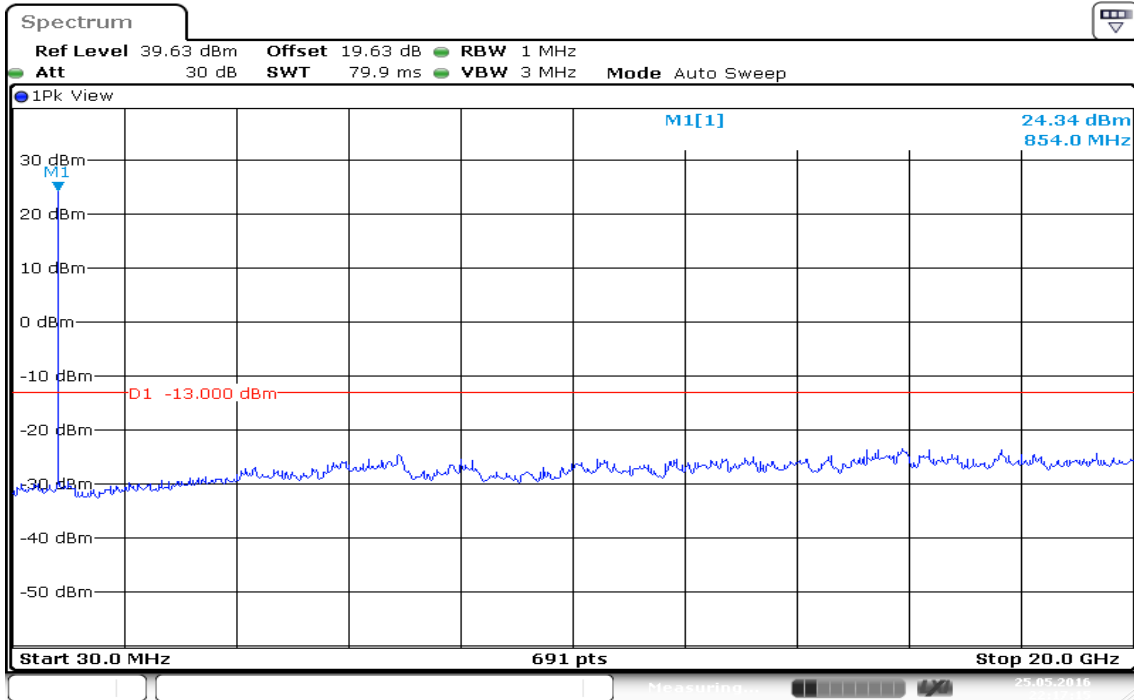


Figure 25-3: Out of Band emission at antenna terminals – HSUPA CH High



Date: 25 MAY 2016 22:17:15

## HSUPA Band II

Figure 26-1: Band Edge emissions – HSUPA CH Low

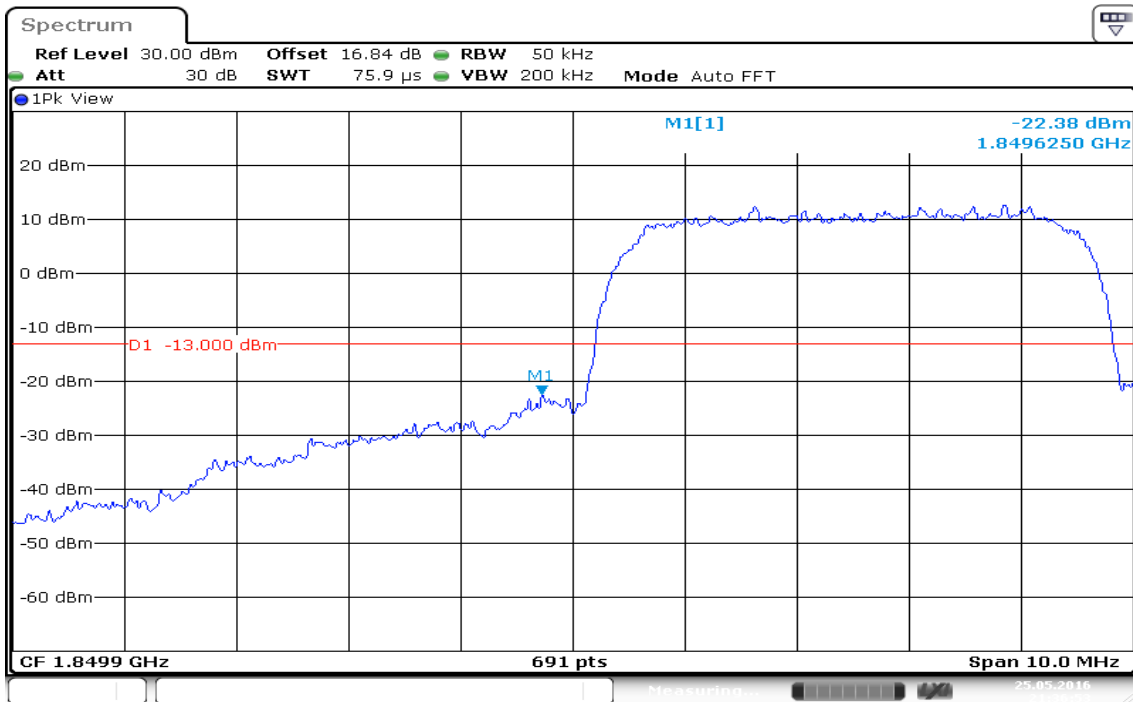
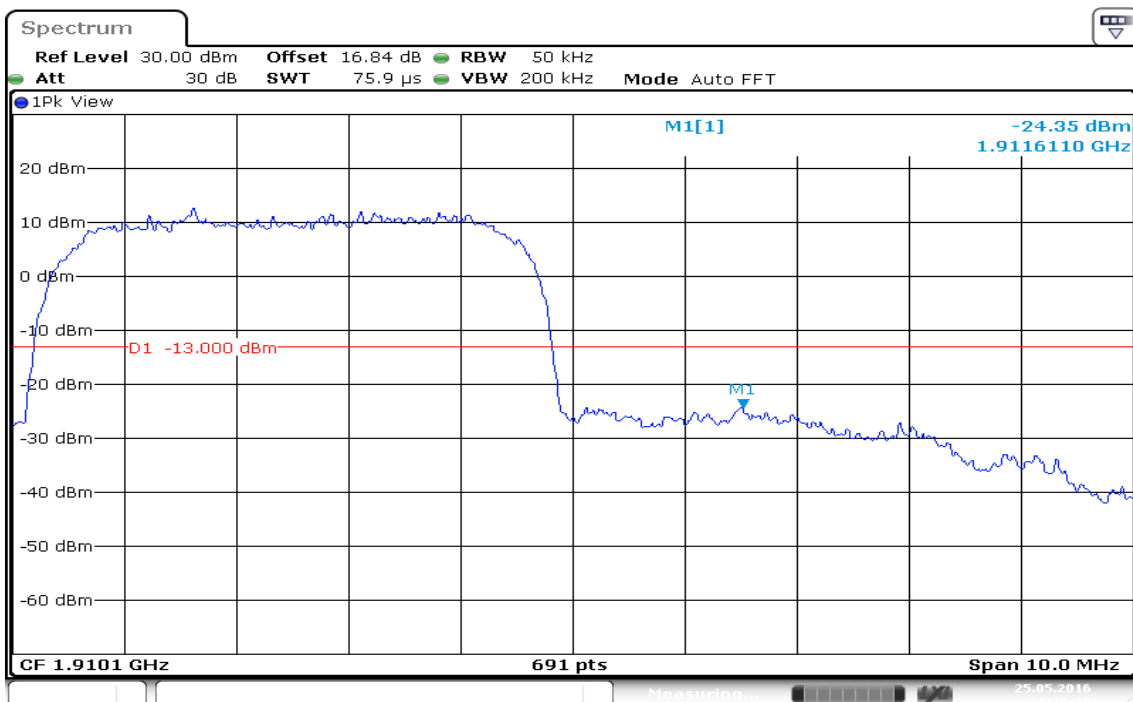


Figure 26-2: Band Edge emissions – HSUPA CH High





## HSUPA Band V

Figure 27-1: Band Edge emissions – HSUPA CH Low

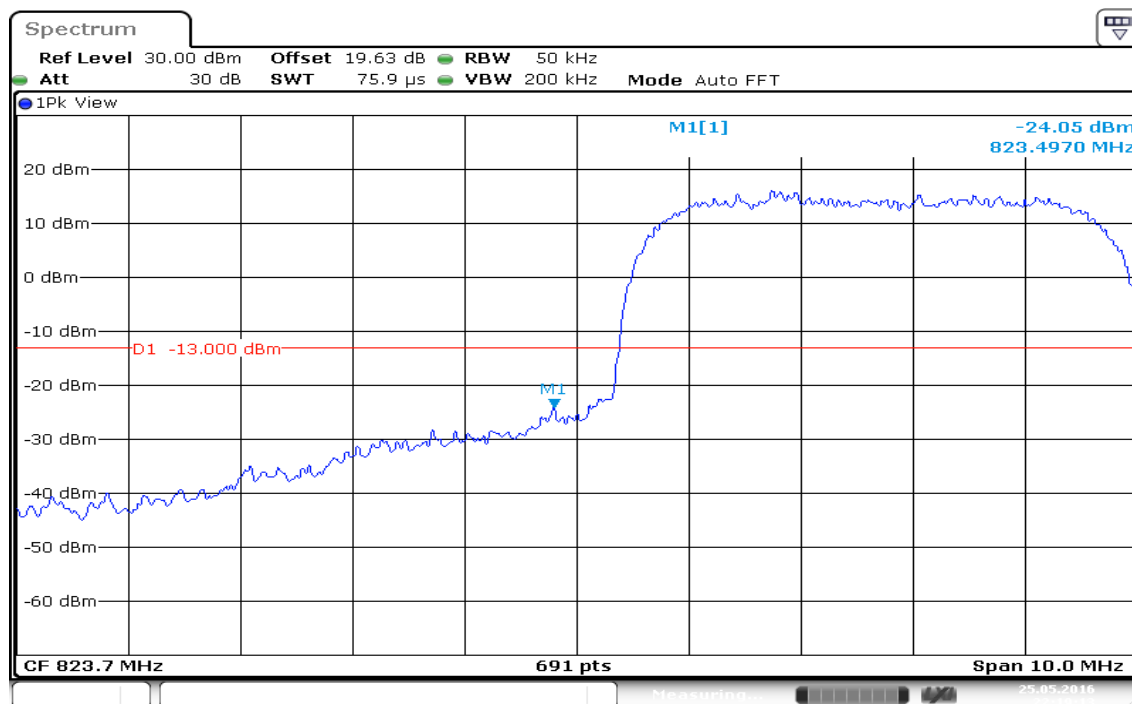


Figure 27-2: Band Edge emissions – HSUPA CH High

